REPORT RESUMES

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REORGANIZED SCIENCE CURRICULUM, 3, GRADE THREE SUPPLEMENT.
MINNEAPOLIS SPECIAL SCHOOL DISTRICT NO. 1, MINN.

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THE FOURTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE THIRD GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPTS TO BE TAUGHT IN GRADES K-3 FOR EACH OF THE FOUR AREAS AROUND WHICH THE PROGRAM IS DESIGNED. THESE AREAS ARE (1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. AT PRESENT THE RESOURCE UNITS SECTION OF THE SUPPLEMENT INCLUDES ONLY AN INTRODUCTORY SECTION ON "METHODS OF SCIENCE"--OTHER UNITS WILL BE ADDED AS THEY ARE DEVELOPED. COURSE CONTENT ASSIGNMENTS FOR K-12 ARE GIVEN IN CHART FORM. IN ADDITION TO THE INTRODUCTORY MATERIAL, SECTIONS OF THE SUPPLEMENT ARE (1) CONCEPTS, (2) RESOURCE UNITS, (3) ANNOTATED BIBLIOGRAPHY, BOOKS, (4) ANNOTATED BIBLIOGRAPHY, FILMS, AND (5) EQUIPMENT AND SUPPLIES. (DH)

SE 003 932

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SCIENTIFIC APPROACH TO PROBLEM SOLVING

1. Observation--first-hand experiences and observation.

2. Definition of PROBLEM--ask questions, choose one for investigation.

3. Results of other investigators--read about problem, discuss it with interested friends and resource people, examine the written material.

4. Possible solutions--list all possible guesses.

5. Choosing the best solution (HYPOTHESIS)--pick the "best guess".

6. Testing the hypothesis--planning and carrying out EXPERIMENTS to determine its truth.

7. CONCLUSION of accepting or rejecting hypothesis--draw conclusion from experiments to determine acceptance or rejection of "best guess".

8. More extensive testing of hypothesis--experiment further to determine if hypothesis always holds true.

9. Stating the THEORY and publishing results--restate the hypothesis in light of the above experimentation, publish in professional journal.

10. Finding mathematical proof--do any measuring and mathematical calculations to develop proof of theory.

11. Statement of LAW or PRINCIPLE--if no one can find a mistake in the mathematical proof or develop a contrary proof, the theory becomes a law or principle.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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THE GRADE THREE SUPPLEMENT

to the

REORGANIZED SCIENCE CURRICULUM

Kindergarten Through Grade Twelve

(For Discussion Purposes Only)

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MINNEAPOLIS PUBLIC SCHOOLS
special school district no. 1
Minneapolis, Minnesota

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MINNEAPOLIS PUBLIC SCHOOLS
special school district no. 1
Minneapolis, Minnesota

October 1, 1962

FOREWORD

Long before that famous October fourth, 1957, when Sputnik I rocketed into orbit, the science teachers of the Minneapolis Public Schools eagerly began work on the reorganization of the science curriculum from kindergarten through grade twelve. This reorganized science curriculum was requested by our instructional staff and developed by representative members of that staff.

The citizen of today must be science literate in order to exercise adequately his duties of citizenship. The contribution of the scientist to our way of life is the methods which he uses to attack a problem and seek its solution. These methods are unique, but more important, they are very useful; they can be applied in the solution of the everyday problem by knowledgeable children at all ages and grade levels, and by adults in all walks of life. If these methods of science are to be learned by the youth of Minneapolis, they must be learned by attacking realistic problems inside and outside the classroom. This practice in the solving of work-a-day problems trains our young citizens to think for themselves in seeking new solutions to age-old problems of our civilization.

In the Minneapolis Public Schools we recognize that science is a very important part of the liberal arts general education which should be studied by all students. We are aware of our responsibility for instruction which must be well grounded in the fundamental laws and principles in all the fields of the basic sciences and therefore propose this reorganized curriculum for teaching the ever-expanding knowledge of science.

This reorganized science curriculum does not teach itself. It is a planned developmental approach in which the teacher is the expeditor and not the limiter of learning. The curriculum has been developed to aid the student in acquiring new breadths and new depths of understanding of his environment; and with it a teacher who is well trained in science may lead the student in an ever-expanding investigation of his surroundings in this world and universe. If the curriculum is used cooperatively by teacher and students, it is an instrument which can mold a pupil of the Minneapolis Public Schools into a science-literate citizen who, if he continues advanced science training, may become a scientist of the future.

Rufus A. Putnam
Superintendent of Schools

INTRODUCTION

This Supplement has been prepared as a convenient reference to assist the third grade teacher in teaching the science content allocated in the Reorganized Science Curriculum. Third grade teachers suggested and assisted with the preparation of each section of this Supplement. Those who have participated in the preparation of this teacher's guide lay no claim to its being "without blemish". However, its value can be determined only by those classroom teachers who use it and make constructive suggestions to improve it. All Minneapolis Public School personnel are invited to cooperate in improving this Supplement in order to make it of genuine assistance to all beginning and experienced third grade teachers. All constructive suggestions should be called in or sent to the Science Department Office.

This Supplement is not complete at the present time. When additional materials are developed, a copy will be furnished to you to place in this loose-leaf binder. Your cooperation with us to keep your Supplement up-to-date will be appreciated. When you leave your school, please leave the Supplement for the next teacher's use.

CONTINUITY OF SUBJECT MATTER, KINDERGARTEN THROUGH GRADE THREE

Introduction to Science

Kindergarten	Grade One	Grade Two	Grade Three
Science and how we learn about it	Some ways of learning science	Using science	Methods of science
			Tools for measurement of time and direction

I. The Earth

Finding out about our earth	Rocks and soil		Features of the earth's crust
			How soils are made
Seeing differences in materials			
Water		Water appears and disappears	Water is everywhere
Air around us	Air around us		Air is everywhere
			What makes the weather?

II. Living Things

Things that are alive			Things alive
			Protecting and enjoying plants and wildlife
Plants around us	Learning about plants	How plants live and grow	How plants depend on their environment
	Kinds of seeds and how they travel		
How animals are different 1. Body covering 2. Movement 3. Habitat 4. Usefulness	Animals need food	Animal behavior	How animals help us
Enjoying animals	Animals use their senses	Animals have young	Animals live in communities
What our bodies need	Our bodies	Understanding ourselves	Our bodies at work

CONTINUITY OF SUBJECT MATTER, KINDERGARTEN THROUGH GRADE THREE

III. Energy

Kindergarten	Grade One	Grade Two	Grade Three
			Liquids and solids
Simple machines		Things that help and hinder work	Mechanical energy
			Earth's gravity
Magnets are fun		Magnets and what they do	
	What we can learn from sound	How sounds travel	
	Electricity works for us		Effects of current electricity
Keeping warm			Sources and uses of heat
How light helps us	Light and shadows	Light and how it is reflected	

IV. The Universe

We look at the sky	Our star, the sun	What we see in the sky	The sun and other stars
	The earth where we live	Movements of the earth	

Minneapolis Public Schools
Science Department
Rev. 9-5-62

(typed by JW)

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SUMMARY OF GRADE-CONTENT ASSIGNMENTS

Area and Major Topics	Grade Level												
	K	1	2	3	4	5	6	7	8	9	10	11	12
Introduction to Science (Gray)	*	*	*	+	*	*	*	+	+	+	+	+	+
A. Attitudes (Including history)	+	+	+	+	+	+	+						+
B. Tools	+		+	+	+		+						+
C. Methods	+		+	*	+	+	+						

. The Earth (Red)	+	+	+	*	*	+		+	*				
A. History of the earth					+				+				
B. Physical features	*	+		+	+				+				
C. Rocks and minerals	+	*			+				+				
D. Soils		+		+	+				+				
E. Water	*		*	+	*			*					
F. Air	+	*		+	*			*					
G. Weather and climate				+		*			*				

Key to symbols -- * major emphasis

+ content to be taught

For discussion purposes only

Area and Major topics	Grade Level												
	K	1	2	3	4	5	6	7	8	9	10	11	12
II. Living Things (Green)	+	+	+	+	+	+		*			*		
A. Life and life processes	+	+	+	+		*		+			+		
1. Life in general	+			*		+		+			+		
2. Food taking or nutrition		*	*	+		+		+			+		
3. Digestion								+			+		
4. Absorption						+		+			+		
5. Circulation				+		+		+			+		
6. Respiration						+		+			+		
7. Assimilation								+			+		
8. Oxidation						+		+			+		
9. Excretion				+		+		+			+		
10. Reproduction and growth		*	*	*		+		+			+		
11. Responsiveness	+	*	+	+		+		+			+		
B. Classification	*	+	+	+		*		+			+		
C. Ecology	*	+	*	*	*			+			+		
D. Plant and animal economics	+	+	+	*	*			+			+		
E. Human Body	*	*	*	*		*		*			+		
F. Aesthetic values	*			*				+			+		

(Continued)

Grade-content assignments (continued)

Area and Major Topics	Grade Level												
	K	1	2	3	4	5	6	7	8	9	10	11	12
III. Energy (Yellow)	+	+	+	+	+	+	+			+		*	+
A. Properties of matter related to energy	+			*			*			*		+	*
B. Sources and conservation of energy	+			+		*				+		+	+
C. Mechanical energy and simple machines	*		*	*			*			*		+	
D. Gravitational energy	+			+			+			+		+	
E. Magnetic energy	*		*	+	*					+		+	
F. Sound		*	*				*			+		+	
G. Electrical energy		*		*		*				*		*	
1. Static						+				+		+	
2. Current		*		*		+				*		+	
H. Communication bands and electronics												+	
I. Heat and infrared radiation	*			*		*				+		+	
J. Light and ultraviolet radiation	*	*	*				*			+		+	
K. High energy waves												+	
L. Chemical energy				+			*			*			*
M. Atomic energy							+			+		+	*

For discussion purposes only

Area and Major Topics	Grade Level												
	K	1	2	3	4	5	6	7	8	9	10	11	12
IV. The Universe (Blue)	+	+	+	+		*	+		*	+			
A. Earth	+	*	*	*		+			+				
B. Moon	*		*			+			+				
C. Sun	*	*	*	*		+			+				
D. Solar system						+			+				
E. Stars and galaxies	*		*	*		+			+				
F. Space travel		+	+	+			*			*			

Key to symbols -- * major emphasis

+ content to be taught

Note: Conservation and safety must permeate science teaching at all grade levels.

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CONCEPTS

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Grade Three

ALLOCATION OF CONCEPTS BY UNIT TITLES

Note: This report presents a list of unit titles, within which the order of the concepts found in the Handbook has been changed to provide a logical teaching approach.

Introduction to Science

A. Methods of science

1. Problem-solving begins with curiosity.
2. Careful observation which depends on a definite purpose may result in discovery.
3. Early man developed habits of keen observation.
4. Most problems originate as a question.
5. A clearly-defined problem is necessary in problem-solving.
6. In defining a problem, there must be questions and investigation.
7. Solving problems in science requires experiences.
8. Many science experiences are needed to provide sufficient evidence on which to base valid conclusions.
9. A variety of resources may help find solutions to science problems.
10. Controlled experiments are observed in science.
11. Accurate observations from first-hand experiences are an important part of the so-called "Scientific Method".
12. Scientists attempt to solve problems arising from observations and experiences.
13. A person who makes and records observations accurately is conducting a scientific investigation.
14. A good scientist is continually searching for truth.
15. Mathematics is the tool used to express science observations most accurately.
16. Special buildings are sometimes constructed in which scientists conduct experiments.

B. Tools for measurement of time and direction.

For this unit it might be helpful to review the concepts taught under the topic of "Movements of the Earth," in the second grade.

1. Time is the measure of duration ("how long it takes").

2. A year is the length of time required for the earth to go completely around the sun.

3. The moon seems to have different shapes at different times of the month.

4. It takes the moon almost a month to go completely around the earth.

5. East and west, and north and south are on opposite sides of the sky.

6. On the surface of a globe, representing our earth, are imaginary lines, some of which extend north and south and some of which extend east and west entirely around the globe.

7. The lines on a globe are useful in locating a position on the earth by east or west longitude and north or south latitude.

8. A compass is an instrument for determining directions.

9. A bar magnet may be used to make a compass.

10. The needle of a compass is a permanent magnet which is mounted on a pivot.

11. Care should be taken in using permanent magnets; permanent magnets lose their energy rapidly by dropping, beating, pounding and heating.

12. Magnets may be made in several ways.

13. Lodestone (magnetite) is a natural magnet.

I. The Earth

  A. Features of the earth's crust

    1. Plains are areas of land masses of the earth which are broad and flat.

    2. The highest mountains have snow on the top all year long.

    3. Islands are small land masses completely surrounded by water.

    4. Man does change the surface of the earth.

  B. How soils are made

    1. Rocks which are worn or broken into small bits may become part of the soil.

    2. Soil is composed of organic materials and minerals.

    3. Wind, water, plants, animals and changes in temperature help make soil.

    4. Rain and rivers help to wear rocks into soil.

    5. Rapidly running water washes away the soil.

    6. Running water may dig gullies.

    7. Water, air and glaciers wear away the surface of the earth.

    8. Excessive amounts of soil erosion are usually caused by poor land use and/or poor conservation practices.

  C. Water is everywhere

    1. Water is a part of all living plants and animals.

    2. All forms of water have weight.

    3. Some materials are dissolved in water.

    4. Water usually contains dissolved minerals.

    5. Water may contain undissolved materials.

    6. Water is removed from many of our foods for preservation.

    7. Streams are moving bodies of water.

    8. Water is used for commercial purposes.

    9. Water power is a useful source of energy when it is controlled.

D. Air is everywhere

1. The air is a part of the earth's crust.
2. The air in soil and water is necessary for life to exist.
3. Carbon dioxide is one of the gases present in the air.
4. All living things supply carbon dioxide to the air.
5. All living things which contain chlorophyll use carbon dioxide from the air in the presence of light.
6. Oxygen from the environment is used by plants and animals.
7. Air in motion may blow soil away.

E. What makes the weather?

1. The moisture that comes out of the air has different forms.
2. Unequal heating of the earth's surface produces winds.
3. Various instruments are used to measure and record different weather conditions.
4. Man can live in every climate because he has devised ways of protecting his body.
5. Children may be temporarily protected from extremes of temperature by use of clothing.
6. The sun causes the seasons.
7. The seasons are caused by the change in the slant of the sun's rays during the year.
8. The earth's axis is tilted.

II. Living Things

A. Things alive

1. All living things are either plants or animals.
2. Only living things can reproduce.
3. All living things are continually changing.
4. Living things may be classified as plants or animals.
5. Plants and animals store food within themselves.
6. Some living things can store water within themselves.
7. All living things produce wastes which must be eliminated.
8. Plants and animals may live together in a balanced aquarium or terrarium.

B. Animals live in communities

1. All animals are wild or domesticated.
2. Animals are found almost everywhere on the earth.
3. Animals live in many different kinds of environments.
4. Some animals live on land and in the water.
5. Some animals live underground.
6. There are more water animals than land animals.
7. Some animals live alone and some live in pairs.
8. Some animals build different kinds of homes to protect themselves and/or their young from their natural enemies.
9. Animals make use of materials in their surroundings for building homes.
10. Plants and animals affect their environment.
11. Many plants provide food and/or shelter for animals.
12. Some animals protect other animals.
13. Animals removed from their natural habitat often die.
14. Earthworms aid plant growth by mixing, enriching and aerating the soil.
15. All warm-blooded and cold-blooded animals must be protected from extreme and rapidly changing temperatures.

C. How animals help us

1. Different varieties of domesticated animals have different desirable characteristics.

2. Domestic animals supply some of man's food and clothing.

3. Animals are useful in many different ways: they provide food, clothing, enjoyment, ownership and comradeship.

4. The integument (outer covering) of many animals furnishes skins and fibers which are processed and utilized by man.

D. How plants depend on their environment

1. Plants absorb air, water, and minerals from their environment.

2. Plants absorb water through their roots and give it off through their leaves.

3. Roots of some plants grow toward water.

4. The sap of a plant is circulated throughout all the living parts.

5. Food may be stored in the seeds, stems, roots, and leaves to provide nourishment for the new plant.

6. Plants respond to their environment.

7. Plants respond to many stimuli.

8. Plants reproduce themselves in many ways.

9. Most flowering plants produce seeds.

10. Seed-bearing plants are annuals, biennials, or perennials.

11. The seeds of most land plants will not grow in water.

12. Most seeds of land plants will not grow under water.

13. Some plants have structures which protect them from certain enemies.

E. Protecting and enjoying plants and wildlife

1. The observation and study of plants and animals contribute to the cultural and aesthetic values of life.

2. If cities are to be desirable places in which to live, wise use of the remaining nature areas is necessary.

3. Wild flower gardens, forest reserves, and bird sanctuaries preserve wildlife so that others may enjoy it.

4. Wild flowers may die if the environment changes.

5. Living things can contribute to the enrichment of leisure time.

6. Many people receive personal pleasure and satisfaction from raising flowers and ornamental plants.

7. The parts of some plants are scented.

8. The beauty of our environment can be appreciated by touching, seeing, tasting, hearing and smelling.

9. Collecting shells, flowers or leaves for pleasure may lead to scientific study.

10. Living things may die if they are transferred to a different environment.

11. Man provides shelter and food for some birds and some other animals.

12. Food supplied for wild animals should be provided regularly.

F. Our bodies at work

1. Energy for growth is supplied from the food we eat.
2. The human body functions better if it has sufficient regular exercise.
3. People appear to be most healthy when physical and mental exercises complement each other.
4. After exercise the body needs rest.
5. Fresh air and sunshine are necessary for proper body functioning.
6. A person may tire quickly after having a disease.
7. A person who has an infection may tire quickly.
8. In human beings, some resemblances between parents and their young increase as the young grow older.

III. Energy

A. Liquids and solids

1. All matter takes up space.
2. All matter has weight.
3. Most materials are made of smaller particles.
4. Some solids bend more easily than others.
5. Solids cannot be identified by their shapes.
6. Many solids take the form of crystals.
7. Many solids can be dissolved by liquids other than water.
8. Some substances do not dissolve in water.
9. Most liquids have a definite freezing temperature.
10. Most matter has a certain temperature at which it melts and boils.
11. The shape of a fluid is determined by its container.

B. Sources and uses of heat

1. Friction produces heat.
2. Friction changes mechanical energy into heat energy.
3. Heat energy can be used for benefit or detriment.
4. Man has learned to use and control heat.
5. Uncontrolled heat can be dangerous.
6. Heat melts most solids.
7. The changing of a solid to a liquid is called melting.
8. Heat causes the expansion of unconfined gases.
9. The wind carries heat away from warmer objects.
10. Light colored objects are poor absorbers of heat.
11. Light colored objects are the best reflectors of heat.
12. There are many heating and cooling devices in the home.
13. A fire needs air to burn.
14. A fire gives off heat.
15. The sun is the chief source of heat energy.

C. Mechanical energy

1. Moving air (wind) produces a force on objects.
2. Objects in motion tend to keep moving in the same direction.
3. A substance which is moving tends to keep moving at the same speed in the same direction.
4. Objects that are at rest tend to resist motion.
5. A substance at rest tends to remain at rest.

D. Effects of current electricity

1. Electricity can be produced in different ways.
2. Current electricity can be produced by dry cells.
3. The flow of electricity is turned on and off by a switch.
4. Electricity has greatly changed man's ways of living.
5. Man's understanding of electricity has been a gradual accumulation of knowledge.

E. Earth's gravity

1. The earth is almost round like a ball and very large.
2. Things are attracted to the surface of the earth (gravity).
3. Gravity holds things on the earth.
4. All objects on the earth have weight.
5. All objects on the earth occupy space.
6. All things on the earth tend to fall toward the center of the earth.
7. Things are pulled "down" toward the center of the earth.
8. "Down" is toward the center of the earth.
9. "Up" is away from the center of the earth.
10. "Falling" is due to the gravitational pull of the earth.
11. Gravitational attraction is always an attraction between two objects.
12. Man needs to overcome the force of gravity in order to leave the planet earth.

IV. The Universe

The sun, and other stars

1. The sun is the nearest star.
2. The sun is an average sized star.
3. The sun is a glowing ball of hot gases.
4. The sun is a ball of many hot, dense gases.
5. The sun is hotter than anything known on the earth.
6. The sun is the basic source of all energy.
7. The sun is necessary for most life.
8. Life on the earth would be impossible without the sun.
9. The earth receives little light from any star except the sun.
10. Some light comes from the stars.
11. Groups of stars form imaginary pictures in the sky.
12. Prominent stars are often referred to as part of a group or constellation.
13. Stars seem to move in the sky.
14. Stars are very much larger than the earth.

RESOURCE UNIT

A RESOURCE UNIT

INTRODUCTION TO SCIENCE -

A. METHODS OF SCIENCE

TO BE TAUGHT IN
GRADE THREE

To be included in the Grade Three Supplement of the
Reorganized Science Curriculum

Minneapolis Public Schools
Science Department
9-4-1962

For discussion purposes only

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INTRODUCTION

This resource unit is quite unusual since most of the suggested experiences are centered around the use of the five senses for making scientific observations.

The study of this unit should help children to recognize that there are certain attitudes of mind and many procedures which are important in finding answers to their questions. The teacher should provide the children with opportunities for practice in the use of the "discovering methods" or the "methods of science" in finding answers to their questions. In this way they are guided into a thorough understanding of how to plan to find their answers. The teacher should help the children discover that the answer to a question may often be found through a logical step-by-step procedure. She should encourage them to devise their own individual logical procedures for answering each question. As teachers, we may call a logical procedure a "method of science" or the scientific method; however, the children should not memorize and use any one of the formal lists of steps in a "method of science" which appears in a book. When no answer can be found as a result of careful planning and experimenting, the children should be reminded that scientists cannot always solve problems in a short period of time or even after long, hard work.

The teacher should note as she teaches the unit that meticulous preparation of materials and the maintenance of extensive records are not as important as a planned, orderly method of investigation. If as the teacher teaches this unit she finds herself asking "What are the desirable outcomes that the children are supposed to gain through these experiences?", she may wish to refer to this Summary of Outcomes:

1. Science questions are most easily answered by using an orderly procedure for investigation.

2. Patient, accurate observing and recording must be done to discover answers to questions.

3. Each of the five human senses may provide information; however, making use of all five senses insures more complete results.

After these experiences have been completed, the class should be able to use the procedures suggested by this unit in attempting to answer other questions which arise in the study of other units in science.

I. CONCEPTS INCLUDED IN THE UNIT

1. Problem-solving begins with curiosity.
2. Careful observation which depends on a definite purpose may result in discovery.
3. Early man developed habits of keen observation.
4. Most problems originate as a question.
5. A clearly-defined problem is necessary in problem-solving.
6. In defining a problem, there must be questions and investigations.
7. Solving problems in science requires experiences.
8. Many science experiences are needed to provide sufficient evidence on which to base valid conclusions.
9. A variety of resources may help find solutions to science problems.
10. Controlled experiments are observed in science.
11. Accurate observations from first-hand experiences are an important part of the so-called "Scientific Method".
12. Scientists attempt to solve problems arising from observation and experiences.
13. A person who makes and records observations accurately is conducting a scientific investigation.
14. A good scientist is continually searching for truth.
15. Mathematics is the tool used to express science observations most accurately.
16. Special buildings are sometimes constructed in which scientists conduct experiments.*

*This resource unit does not offer any suggestions for learning experiences for the teaching of concept #16. The responsibility for planning a study trip or classwork to teach this concept is left to the classroom teacher.

II. OVERVIEW

A. Purpose

Teachers do not often teach this type of unit and may find teaching it an unusual experience. As this unit is used, teachers should keep in mind that its aim is to teach the "how" or the "methods" used in securing information and not merely the facts of science.

Listed below are some typical steps used in the "methods of science" in solving problems or in attempting to answer questions. However, not all of the steps suggested below may be necessary to find the answer to any one specific question. If these steps are followed, the teacher does not "give the answer". Instead, the teacher and children try together to "discover the answer".

1. Asking: We have a question to ask or a problem to solve. We must write down our question or problems in simple language. This question must be clear to all members of the class who work on it and must be kept before us throughout our investigation.

2. Observing: We must find out all we can about things which are related to our question or problem. There are many ways of collecting the various kinds of information. Some things we can do to help us obtain information are:

   a) carry out experiments after careful planning,

   b) locate sources of information in a library or museum such as books, periodicals, films, exhibits, pamphlets and tapes,

   c) read books and periodicals, view films and listen to tapes,

   d) consult other people who have had experiences with some phase of the question or problem, and

   e) confer with a librarian or experts in the field to obtain suggestions for other sources of information.

3. Educated guessing: After reading and investigating, we determine the best answer (guess) to our question, basing the guess upon all the available observations and information.

4. Testing: We try out our guessed answer to see if it is true or false. We may verify the truth of our guessed answer by planning more experiments and investigations. We may test by comparing our results with the results which others have obtained. We may confirm our results by again consulting our textbooks and our other sources of information. We may then be able to conclude whether our guessed answer is true or false. (Remember that some questions have never been answered and many problems remain unsolved.)

5. Concluding: If the guessed answer is correct, we have learned the answer to our question; if the guessed answer is wrong, we do not have the answer to the question.

The number of steps used and the order of their use depend upon the kind of question to be answered or the problem to be solved. The children should be guided to make repetitive use of these steps in planning their investigations, but it is not necessary to list the steps or point out to the children continually that they are using the "methods of science". As the children suggest and try out answers to their questions, the teacher should help them see that there is not one exactly right procedure (or one exactly wrong procedure) which leads to the answer of the question. As different procedures are suggested, one of them may seem best or most logical. When this happens, the teacher should encourage the children to use this most logical procedure. The point to be stressed is that there is a logical order of method, or procedure to follow, in the finding of answers to questions or solutions to problems.

B. Organization

The pupil experiences in this resource unit are divided into four sections.

The first section contains an extensive motivational experience in which the children examine evidence concerning the truth of some common sayings.

The second section suggests five learning experiences that require the children to use each of their five senses immediately. The children should develop an understanding of the use of their own senses in making certain types of observations. They must develop their ability to use the results of these observations to make educated guesses about the possible answers to the questions or the solutions of problems. These five experiences are followed by two more questions which require the use of more than one sense concurrently.

The third section of the pupil learning experiences suggests a question that requires more complete or extensive use of the "methods of science". It may be necessary for the children to read carefully, ask questions of resource people, and write out their answers for the use of other children attempting to answer the same question.

The fourth section is an experience to review, summarize and emphasize the planned method of seeking answers to questions and solutions to problems.

A word of explanation is necessary concerning the organization of each experience. In general, the experiences are written as if the teacher is giving instructions to the children. The teacher will be immediately aware that it is not the intent of the unit that the questions or directions be read to the students. The teacher must interpret these questions and instructions to the pupils.

In the "Questions to Guide Discovery" section, some of the questions suggested may be more valuable before the experience has actually been started, while other questions may be more valuable near the end of the experience. To help the teacher, suggestions for the "Questions to Guide Discovery" are accompanied in a few cases with possible answers indicated by e.g. The teacher must use judgment as to which questions to ask and when these questions would be most valuable to the classwork.

Throughout all the learning experiences in this resource unit, the children should be asked to give the reasons behind their answers. No "wild" guessing should be permitted. The teacher should emphasize to her students that answers or opinions must be based on accurate and complete observations. This type of answer is not usually made by all third graders. Therefore, it must be repeatedly experienced. Children very often learn best when given opportunity to observe and when the accuracy of such observing is made to seem important in the drawing of conclusions.

This resource unit is not written to be followed literally and rigidly. It contains learning experiences, suggested by teachers, which have been found to produce desirable results. When teaching this science unit in third grade, read this resource unit and plan its use and/or modification to produce the most effective learning by the specific group of children in the classroom.

III. LEARNING EXPERIENCES

A. Motivational Experience - Can we prove the truth of these sayings?

Materials needed:

- List of sayings (see Appendix A)
- Barometer, Aneroid
- Cat, black
- Toad
- Compass
- Dip needle (magnetized needle free to rotate vertically
- Almanac, Farmer's (available at newspaper stands, drugstores)
- Magnet, permanent
- Thermometer, outdoor
- Weather data from newspaper
- Poem, short
- Ruler, 12"
- Fruit, fresh (peach, plum, or apricot)
- Water
- Rabbit's foot
- Detergent, liquid
- Coin (foreign or unusual)
- Calendar which indicates phases of the moon
- Stepladder, 6' tall
- Cloth, white, cotton
- Pen, ball point
- Chocolate
- Grass
- Mud
- Polish, fingernail
- Paper, tissue
- Pencil
- Paper

Questions to guide discovery:

1. Do we disagree about the truth of each saying? Why?
2. How can we find out if the saying is true?
3. Can we question, read, and experiment (try out) in order to find out if these sayings are true or false?
4. What do others report about the saying?
5. How many people do we know who believe it?
6. What reasons do we now have for thinking the saying is true or false, e.g., I touched the toad and didn't get warts; we took the compass outside - north isn't up.
7. How does your answer agree with what the class thought about the saying before we tested it?
8. What do our sources of information tell us concerning the truth of the saying?

What to do:

Mark an "X" on the list in front of each saying which you have heard before (see Appendix A). Put a circle around the number of the sayings which you believe are true. Tabulate the results for all the children who mark the list. Test the truth of each saying. (See suggestions which follow.)

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Saying #1 - Air pressure inside a building is different from what it is outside.

Measure the air pressure inside the classroom with all the windows closed, using an aneroid barometer placed on the window sill. Open a window and measure the air pressure on the window sill outside the classroom window. Measure the air pressure inside the house and then immediately measure the air pressure out-of-doors. Summarize the results. Decide whether the saying is true or false. Give the reasons.

Saying #2 - A black cat crossing your path means bad luck.

Keep a list of good things and a list of bad things which happen to you over a period of three days. Allow a black cat to walk in front of you. Keep a list of good things and bad things which happen to you over a period of the next three days. Conclude whether bad luck is caused by the black cat crossing your path. Have some other children repeat the experience starting on a different day of the week. Compare results. Determine whether the day of the week made any difference in the results by repeating the entire experience. Decide whether this saying is true or false. Give the reasons.

Saying #3 - Toads cause us to have warts if we touch them.

Have all the children inspect their hands very carefully for warts. Have those with warts either not participate or else tell how many warts they already have. Obtain volunteers to touch a toad. Pass the toad among the volunteers. Inspect their hands again the same day, a few days later, and a few weeks later. Summarize the observations. Decide whether this saying is true or false. Give the reasons.

Saying #4 - A rising barometer means stormy weather.

Observe the barometer each morning and afternoon for a number of days. Record the date and the barometer readings and weather conditions twice daily (see Appendix B). Identify the days when the barometer was rising. Look at the record of the kinds of weather observed the next day. Ask some good readers and printers to do the detail work on this activity. Decide whether this saying is true or false. Give the reasons.

Saying #5 - North is always up; south is always down.

Place a compass on a non-magnetic table. Note the exact direction in which the north-seeking end of the needle points. Hold a dip needle so that the north-seeking end is lined up in the direction the compass needle points. Observe the direction of the north-seeking end of the dip needle. Decide whether this saying is true or false. Give the reasons.

Saying #6 - The almanac can predict the weather conditions each day for a whole year in advance.

Find the prediction of weather in a current Farmer's Almanac. Keep accurate records of the weather which occurs on the days covered by the Almanac's predictions. Compare the Almanac's prediction to the observed weather conditions. Summarize the results. Decide whether this saying is true or false. Give the reasons. (Note: Since the Almanac is written for Boston, a correction must be made. Subtract one day from all dates given because the prevailing winds cause the general weather movement to be from west to east. Subtract 14° F. from each winter temperature given to account for the difference in latitude and altitude.)

Saying #7 - A fast learner does not remember what he learns as long as a slow learner.

Hand out a copy of a short poem to everyone in the class. Ask each child to memorize the poem as quickly as possible. Have the children return the copy of the poem and recite it to you in a whisper. Record the exact number of minutes it took to memorize the words of the peom accurately (see Appendix C). Choose several children to do the timing and recording. Make sure everyone has returned his copy of the poem and that he has not written it down on a separate piece of paper. Do not warn the children that they will be asked to recite the poem again. Wait two weeks and have each child recite the poem again in a whisper without letting him look at the copy of the poem. Compare the length of time required to memorize the poem the first day to how well the poem is remembered two weeks later for each child. Decide whether this saying is true or false. Give the reasons.

Saying #8 - Brains and beauty do not go together.

Ask a sixth grade teacher to send six girls into your class to be contestants in a beauty contest. Have each girl carry a card with a letter on it. Give everyone in your class a ballot (see Appendix D). Make sure the children do not talk about their vote. Have each child put the letter of the girl whom he considers the most beautiful after number 1. Record the letter of the second most beautiful after number 2. Continue rating the girls until the letter of the least beautiful is recorded after number 6. Have your teacher tabulate the vote. Ask your teacher to obtain the grade average for all subjects for each girl and plot a bar graph of grade average against rating for beauty (see Appendix E). Ask your teacher to be sure that no one discovers which bar of the graph represents each girl or who won the beauty contest. Decide whether this saying is true or false. Give the reasons.

Saying #9 - The distance from an adult's wrist bone to his elbow bone is the same as the length of his foot.

Measure the length of your mother's arm from wrist bone to elbow and the length of her foot (not the shoe). Record both measurements. Repeat the measurements on several other adults. Compare the two lengths for each person. Summarize your results. Decide whether this saying is true or false. Give the reasons.

Saying #10 - Fruit stains are more difficult to remove from cloth than other stains.

Tear a piece of white cotton cloth into six or more pieces. Rub one piece with a piece of fresh fruit. Rub some chocolate on the second piece, ball point pen on the third, mud on the fourth, fingernail polish on the fifth, and grass on the sixth. Pour some liquid detergent on each piece, rub and wash in lukewarm water. Observe the pieces of cloth to see which stains are removed. Decide whether this saying is true or false. Give the reasons.

Saying #11 - A rabbit's foot brings good luck.

Put a rabbit's foot in a pocket. Keep a list of good and bad things that happen during three days. Take the rabbit's foot out of the pocket. Keep a list of good and bad things happening for three more days. Have some other children repeat the experience. Compare each child's list of good and bad happenings. Summarize the observations. Decide whether this saying is true or false. Give the reasons.

Saying #12 - A special coin can bring good luck.

Put a special coin in a pocket. Keep a list of good and bad things that happen during three days. Take the special coin out of the pocket. Keep a list of good and bad things happening for three more days. Have some other children repeat the experience. Compare each child's list of good and bad happenings. Decide whether this saying is true or false. Give the reasons.

Saying #13 - All artistic people have long, slender hands.

Select a jury of volunteers. Ask them to decide who is the best singer, who is the best drawer, and who is the best actor in the classroom. Trace the outline of the right hand of each of the children in the classroom on tissue paper. Compare the length of each hand outline by placing one sheet on top of another until the three hand outlines which are the most long and slender are selected. Discover if the hand outlines belong to the pupils who were selected as the best singer, best drawer and best actor. Repeat this procedure in another classroom. Summarize the results. Decide whether this saying is true or false. Give the reasons. (Note: If you think of artistic as referring to good drawing only, have the jury select only the three who draw the best.)

Saying #14 - The number of days in a month was decided upon by observing the moon.

Choose a calendar which shows the date of the new moon. Look at the calendar to see how many days are in each month. Observe whether the calendar shows the new moon on the same date each month. Summarize your findings. Decide whether this saying is true or false. Give the reasons.

Saying #15 - It is bad luck to walk under a ladder.

Set up the stepladder in the classroom. Ask some volunteers to walk under the ladder. Have each child in the classroom keep a record of the good and bad things which happen to him during the rest of the day. Compare the records of the children who did not walk under the ladder with the records of the volunteers who walked under the ladder to discover whether walking under a ladder has had any affect on luck. Decide whether this saying is true or false. Give the reasons.

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Summarize the conclusions formed about the truth of each saying. Use a ruler to guide your pencil and underline the true sayings. Draw a red pencil line through the false sayings.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

B. Developmental Experiences

1. Sight - Can we identify objects when we see them?

Experience 1: Can we save time by using our sense of sight to sort buttons?

Materials needed:

Buttons
Bags, paper, small
Pencil
Paper

Questions to guide discovery:

1. How can this collection of buttons be made useful to someone who wishes to match a button?
2. What possible ways are there to sort out these buttons, e.g., size, color, what are they made of?
3. If there are times when different methods of sorting would have to be used, what other methods are possible,
    a. if you wanted to keep only buttons that are not plastic?
    b. if your collection contained only all white buttons?

What to do:

Collect as many different kinds of buttons as possible. Ask all the other members of the class to bring buttons. Include no more than two buttons of a kind if there are matching buttons.

Choose any two buttons exactly alike. Put one in a pocket. Pile all the other buttons (including the mate to the one in the pocket) into one pile.

Show a child the button in the pocket. Have him find the matching button from the pile. Record the time required to find the matching button.

Have the child sort the buttons into a number of smaller piles. Lead him in sorting by asking, "How could you make it easier for yourself if you had to find a mate for another button?". Have him place each pile into a bag and label the bag with the description of the kinds of buttons in it.

Use a pair of buttons which is different from those used in the beginning. Put one of the pair in a pocket. Place the other button in the proper bag, keeping the child who sorted the buttons from watching. Put it in the "Red Buttons" bag if he sorted them by color and the button is red.

Have the child find the button that matches the one which was kept out. Record the time required to find the matching button.

Repeat the experience with other children. Record the time required to locate the button from the unsorted piles and the sorted piles for each child.

Compare the results. Determine whether grouping things by one or more characteristic (size, shape, color) helps speed identification of an object.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

Note: This experience could be varied by sorting keys, twigs or leaves. If the experience were modified to have each child blindfolded, it could be used to teach the importance of one or several of the other senses.

Experience 2: Can we identify objects if we see only a small part of them?

Materials needed:

Box, 1½" deep, without cover
Box, 2" deep, without cover
Box, 2½" deep, without cover
Gum wrapper, stamp, or any paper object that light will penetrate (need not be transparent)
Paper, onionskin or waxed
Cement, rubber
Pin, common
Pencil
Paper

Questions to guide discovery:

1. How can we identify these objects by seeing only a part of them?

2. What reasons do we have for thinking our guesses about each item are correct, e.g., it must be a gum wrapper because the color and pictures are right; I see part of "Easter" on the card; no other comic except a gum wrapper could be so small.

3. Why is it easier to identify the objects if we see the whole object instead of part of the object?

4. How does each person's observations compare with what most of the class observe?

5. Why should we check with the teacher to learn the identity of the object?

6. How is sight used to identify objects, e.g., I remember seeing that shape on my gum wrapper; I knew because of the color.

7. Could we have solved the stated problems more quickly by using more than the sense of sight? How?

What to do:

Glue the gum wrappers to the onionskin paper with rubber cement. Cover the edge of each box with rubber cement and turn it over onto the onionskin.

Attach the smallest box to a window with the onionskin paper against the glass. Make a small pin hole in the center of the bottom of the box.

Have a child peek into the box for 15 seconds to try to identify the piece of paper (gum wrapper). Record his observation.

Have several other children repeat the observation.

Attach the 2" box to a window and repeat the experience. Repeat again using the largest box. Compare the results to determine why it is easier to identify the gum wrapper in the larger box.

Repeat the entire experience using a different piece of paper to identify, varying the time allowed for the observation. Compare the results.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

2. Sound - Can we use sound to identify coins?

Materials needed:

Penny
Nickel
Dime
Quarter
Pencil
Paper
Half dollar
Silver dollar
Coins, tiny (such as those given as premiums or souvenirs)

Questions to guide discovery:

1. How can we identify these coins by listening to them and learning their sound?
2. What reasons do we have for thinking our guesses about each item are correct, e.g., it has a tinkling sound; it sounds like a heavy coin; it has the clink of a silver coin; copper and nickel sound different.
3. How does your observation compare with the observations made by the rest of the class?
4. Why should we check our guesses by asking which coins were dropped and in what order they were dropped?
5. Could we have solved the problem more quickly by using more than the sense of sound? How?

What to do:

Show the collection of coins to a group of children. Drop them, one coin at a time, so the children can "practice" listening to them. Identify each coin as it is dropped.

Drop the coins again, one by one, onto a different surface. Note the difference in tone. Invent a code for each coin, e.g., 1 finger -- penny; 2 fingers -- nickel; 3 fingers -- dime; 4 fingers -- quarter; fist -- half dollar.

Have the children form a line standing side by side with their backs toward you. Ask them to identify each coin. Have them hold out their fingers on the hand behind their back, using the code to indicate their guess.

Record the number of right guesses and the number of wrong guesses. Repeat the experience using a longer practice session. Ask the children to describe the sound of each coin. Compare the results.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

3. Smell - Can we use an odor to identify a material?

Materials needed:

Containers, leakproof and opaque (several)
Material to be identified by odor (alcohol, carrots, cinnamon, orange, nail polish, strong soap, vanilla)
Paper
Pencil
Scissors

Questions to guide discovery:

1. How many of these materials can be identified by smelling of them?
2. What reasons do we have for thinking our guesses about each item are correct, e.g., it smells like a hospital; it has a spicy smell; it smells like a dry cleaning place.
3. How does one person's observations compare with what most of the class observe?
4. Why should we open the containers to find out whether our guesses were right?
5. Could we have solved the problem more quickly by using more than the sense of smell? How?

What to do:

Place in each container a small amount of one material. Close the container. With a scissors punch a few small holes in the top. Prepare several other containers with other materials in a similar manner.

Pass the container around the group. Have the children smell the container. Have them write the name of the item which they had smelled on a slip of paper after you have taken the container away. (Note: Some children may have to put down only the initial sounds of what they smell. They may have to whisper what it is to the teacher.)

Repeat with each of the other containers. Determine whether the sense of smell is a good way to identify substances.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

4. Touch - Can we use the sense of touch to identify objects?

Experience 1: Can we identify these materials by feeling them?

Materials needed:

Containers, several
Sandpaper
Paper, tissue
Paper, wax
Cellophane
Foil, aluminum
Carton, egg
Blindfold, one for each child
Pencil
Paper

Questions to guide discovery:

1. What reasons do we have for thinking our guesses about each item are correct, e.g., it is rough; it is thinner paper than the others; it has a waxy feeling; it is the heaviest paper; it has a cool feeling; it feels like a present.
2. How does one person's observations compare with what most of the class observe?
3. Why should we look to check our guesses?
4. Can we identify our materials more readily by using more than the sense of touch?

What to do:

Paste one of the materials to the bottom of each container.

Blindfold a child. Allow him to feel the surface and edges of each sample. Record his identification of the samples.

Repeat the experience with several other children. Tabulate the results.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

Experience 2: Can we identify individual people by using our sense of touch?

Materials needed:

Record sheet (see Appendix F)
Blindfolds, one for each child
Pencil

Questions to guide discovery:

1. Are all the children the same height?
2. Do they all have the same kind of shirts?
3. Which of the children are wearing rings?
4. How does one person's observations compare with what most of the class observe?
5. Should we check our guesses by looking at the children? Why?

What to do:

Divide the class into two groups. Designate both groups by a number. Explain that each group will try to identify the members of the other group while blindfolded.

Have the children in group 1 observe each member of group 2. Note any special kinds of trinkets or clothing. Each member of group 2 will carry a pencil and a record sheet (see Appendix F).

Have each member of group 2 record his name at the top of his record sheet. Explain that the members of group 2 have to keep a record of the guesses made about themselves. Time the activity so that each person has one minute to decide whom they are touching and 30 seconds to whisper whom they think they are touching and to give their reason why they make this guess. Caution everyone in group 2 not to make a sound.

Blindfold each child in group 1 and have them feel each member of group 2 above the waist, in turn. Have each person in group 2 or the teacher count the number of right guesses and list the reasons used to explain the right guesses.

Have the members of group 2 study the wrong guesses to see if they can tell for whom each was most generally mistaken and if they can explain why. Ask the better readers and printers to be secretaries for the experiences if you need them.

Repeat the experience the next day by blindfolding the members of group 2.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

5. Taste - Can we identify materials by tasting them?

Materials needed:

Toothpicks
Cups, custard, pyrex (4)
Honey
Butter
Catsup
Syrup, maple
Container, waste
Blindfolds, one for each child
Pencil
Paper

Questions to guide discovery:

1. What reasons do we have for thinking our guesses about each item are correct, *e.g.*, it is sweet; it has a tomato taste.

2. How does one person's observations compare with what most of the class observe?

3. Should we find out by looking into the containers whether we were right? Why?

What to do:

Wash your hands. Wash thoroughly and sterilize several custard cups. Place a small amount of honey in one custard cup. Prepare the other sample foods in a similar manner.

Put one end of a number of toothpicks into each container. Ask the teacher to supervise the work and approve the samples.

Blindfold a child. Hand him a toothpick from one sample. Have him taste the sample and identify the sample. Throw the toothpick into the waste container. Test the other samples in the same way. Record his observations.

Repeat the experience several times with other blindfolded children.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

Note: Variations to this activity are interesting. Powdered drinks (root beer, cherry, orange) could be used if wet toothpicks, dipped in the powdered material, are tested. Another possibility would be the identification of white powders (soda, salt, flour, baking powder, onion salt).

Caution: The children should be cautioned against tasting anything and everything as occasionally there are materials around the classroom and in the home which are poisonous or detrimental to the person who tastes them.

6. Several senses - Can we use a combination of senses to speed identification?

Experience 1: Can we discover what is in a box without opening it by using several senses?

Materials needed:

Box with cover, approximately 6" x 6" x 2" deep
Materials with an odor (a lifesaver, a cookie, candy, a graham cracker)
Tape, masking
Pencil
Paper

Questions to guide discovery:

1. What do we guess is in a box after lifting, shaking, smelling and listening?
2. How does one person's observations compare with the observations of most of the class?
3. Can we identify an unknown object?

What to do:

Place the sample material in the box. Tape the cover on the box. Punch several pin holes in the sides of the box near the top.

Have several children smell and shake the box one at a time. Ask them to identify the sample. Record the "guesses" made by each child.

Repeat the experience with another group of children, allowing them to ask questions about the object which you answer either "yes" or "no". Record the guesses made by each child. Compare the results.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

Note: As a modification of this experience it might be interesting to ask the teacher questions about the "characteristics" of the material to be answered by "yes" or "no" to help find out what is in the box before the answer to the original question is formulated.

Experience 2: Can we use our senses to identify foods?

Materials needed:

Fruits, canned (pineapple, applesauce, apricots, papaya, cherries, peaches, pears, boysenberries, gooseberries)
Cup, paper, small
Toothpicks
Blindfolds, one for each child in group 4
Container, waste
Tally record (see Appendix G)
Pencil

Questions to guide discovery:

1. What do we want to find out by this experience?
2. Do we come out with different results for each group? Why?
3. Which sense or senses seem most important in identifying foods?
4. What experiences could be done to test our guessed answer?
5. What logical procedure did we use to find out how people identify foods?

What to do:

Divide the class into four groups. Obtain samples of at least 5 different kinds of fruit. Be sure to include papaya since this fruit is unfamiliar tasting but looks like peaches. Do not let anyone know what kinds are used.

Place a small cube of each kind of fruit in paper cups. Have the first group hold their noses and identify the fruit with sight only. Record the number of people in group 1 who identified the fruit correctly. Record their identification of the fruits.

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Mix up the order of the samples. Blindfold the children in the second group. Have the second group smell the samples to identify them. Record their results.

Prepare new samples. Cut the fruit into very small pieces. Blindfold the children in the third group and have them hold their noses. Put a small piece of each sample on a toothpick and allow the third group to taste the sample. Collect the toothpicks in a waste container.

Prepare more samples if necessary. Have the fourth group identify the fruits using their senses of sight, smell and taste. Record their results. Collect the toothpicks in a waste container.

Tally the results from each group. Determine which method of identification is most accurate.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

C. Concluding Experience - Can we discover what conditions favor food spoilage?

Materials needed:

Bread, bakery or home-made, 4 pieces
Paper, blotting
Jar, glass, with screw lid, (4)
Apples
Knife
Drying rack, or needle and thread
Hamburger, raw
Glass, magnifying
Foil, aluminum
Grapes
Refrigerator

Questions to guide discovery:

1. Does water make food spoil?
2. Does the food spoil because it was set in a warm place?
3. Does the food spoil because it was put in the dark?
4. Does spoiled food look, taste, smell and feel the same as it did when it was fresh?

What to do:

1. Investigate the conditions which favor food spoilage. Expose all 4 pieces of bread to the air for a short time.

   Put wet blotting paper in a jar. Dampen one slice of bread. Put the moist bread in the jar and screw the lid on tightly. Put the jar in a warm, dark place.

   Prepare a second jar, using a piece of dry bread and a dry blotter. Do not moisten. Screw the lid on tightly and put the jar in a warm, dark place.

   Prepare the third jar, using a wet blotter and moist bread. Screw on the cap tightly. Do not store the jar in a warm place; place it in the refrigerator where it is cool and dark.

   Prepare the fourth jar, using a wet blotter and moist bread. Do not completely cover the sides of the jar with the blotter. Set the jar on the window ledge so that the bread is exposed to the sunlight every day.

Remove the bread from the jars after 5 days and look at each piece of bread closely. Observe the "speckles" on some of the bread with a magnifying glass. Record the observations.

2. Core, pare and thinly slice some apples. (Caution: Have the teacher help with this.) Put these on a drying rack or string them on a thread with a knot between each piece so that the slices are about 1/2" apart. Leave a whole apple near the sliced pieces of apple.

   Observe which dries out first. Observe whether the whole apple or the apple slices have become rotten by the end of four weeks. Record the observations.

3. Divide the ground meat into three parts. Wrap each part in aluminum foil.

   Place one package on the science table. Set the second on the lower shelf of the refrigerator. Put the third package in the freezing compartment of the refrigerator.

   Examine each package daily for about two weeks. Determine whether the meat in all three packages has become rotten. Record the observations. Discover which package of meat is most rotten.

4. Make a container which keeps out light by wrapping aluminum foil tightly around a jar. Put a small bunch of grapes in this container.

   Put another bunch of grapes in another glass jar which is not wrapped with aluminum foil. Place the jars on a window ledge so that sunlight shines on both jars daily.

   Observe the jars once a day for two weeks. Discover which bunch of grapes is less moldy. Record the observations.

   Note: Since fruit flies may develop, the jars should be capped tightly.

- -

Write a summary of the observations and draw conclusions.

Discuss the results of the experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

D. Review Experience - Can we make a list of the steps we use to find answers to our questions?

Materials needed:

Paper
Pencil

What to do:

Recall the steps taken to answer the question or solve the problem in each experience. Have each child list in his own words the steps which the children used.

Compile these lists into one so that the class has its own "methods of science", e.g.:

a. We asked a question.

b. We observed. We watched the experiments as they were set up and noticed what was going on.

c. We made some educated guesses. (We began to get the idea that foods spoil when they have water in them, when they are kept in a warm room, and when they are stored in darkness.)

d. We tested our guesses. (When we were through with our experiences, we checked what our experiences showed us about food spoilage with what is done with foods at home and in stores and factories to keep them fresh.)

e. We wrote out our conclusions.

Discuss the results of this experience. Summarize each child's answer to the original question. Formulate a group answer to the original question. Give the reasons.

IV. BIBLIOGRAPHY

A. Films

1. Our World of Science, Encyclopedia Britannica Films, 1956.

   10 min., black and white, sound.

   To show children how one class solves a problem by using the methods of science.

2. Ways to Find Out, Churchill-Wexler Productions, Inc., 1957.

   12 minutes, color, sound.

   To teach children how their senses help them get information.

B. Filmstrip

1. What is an Experiment?, Jam Handy Organization, 1955.

   24 frames, color, 35 mm. (Series: First Experiments About Weather, 6 filmstrips in series)

   Excellent for helping students perceive what experiments are performed to answer a question or solve a problem. This filmstrip might be used to stimulate children to recognize questions of their own and to set up their own program of experiments to answer their questions.

V. SUMMARY LIST OF MATERIALS NEEDED

Almanac, Farmer's
alcohol
apples
applesauce
apricots

Bags, paper, small
barometer, aneroid
blindfold, 1 for each child
blueberries
boysenberries
bread (bakery or homemade) 4 pieces
box, 1¼" deep
box, 2" deep
box, 2½" deep
box, 6" x 6" x 2" deep with cover
buttons
butter

Calendar which indicates phases
of the moon
carton, egg
cat, black
catsup
candy
carrots
cellophane
cement, rubber
cherries
chocolate
cinnamon
cloth, white cotton
coin, foreign or unusual
coins, tiny (such as those given
as premiums or souvenirs)
compass
container, several (leakproof
and opaque)
container, waste
crackers, graham
cups, custard (pyrex) 4
cups, paper, small

Detergent, liquid
dime
dip needle
drying rack

Foil, aluminum

Glass, magnifying
gooseberries
grapes
grass
gum wrappers (or translucent
paper)

Half dollar
hamburger (raw)
honey

Jar, glass, with screw lids (4)

Knife

Lifesaver

Magnet, permanent
mud

Needle
nickel

Orange

Paper
paper, blotting
paper, crepe
paper, onionskin
paper, tissue
paper, wax
papaya
peaches
pears
pen, ballpoint
pencil
penny
pineapple
pin, common
poem, short
polish, fingernail

Rabbit's foot
ruler, 12"
refrigerator

Sandpaper
scissors
silver dollar
stepladder, 6' long
soap, strong
syrup, maple

Tape, masking
thermometer, outdoor
thread
toad
toothpicks

Vanilla

Water
weather data from newspaper

APPENDIX A

Name ______________________________________

__________ 1. Air pressure inside a building is different than it is outside.

__________ 2. A black cat crossing your path means bad luck.

__________ 3. Toads cause us to have warts if we touch them.

__________ 4. A rising barometer means stormy weather.

__________ 5. North is always up; south is always down.

__________ 6. The Almanac can predict the weather conditions each day for a whole year in advance.

__________ 7. A fast learner does not remember what he learns as long as a slow learner.

__________ 8. Brains and beauty do not go together.

__________ 9. The distance from an adult's wrist bone to his elbow is the same as the length of his foot.

__________ 10. Fruit stains are more difficult to remove from cloth than any other stains.

__________ 11. A rabbit's foot brings good luck.

__________ 12. A special coin can bring good luck.

__________ 13. All artistic people have long, slender hands.

__________ 14. The number of days in a month was decided upon by observing the moon.

__________ 15. It is bad luck to walk under a ladder.

Note: The teacher may ask the children to contribute sayings to be tested.

APPENDIX B

Date	Morning Barometer Reading	Morning Weather	Afternoon Barometer Reading	Afternoon Weather

APPENDIX C

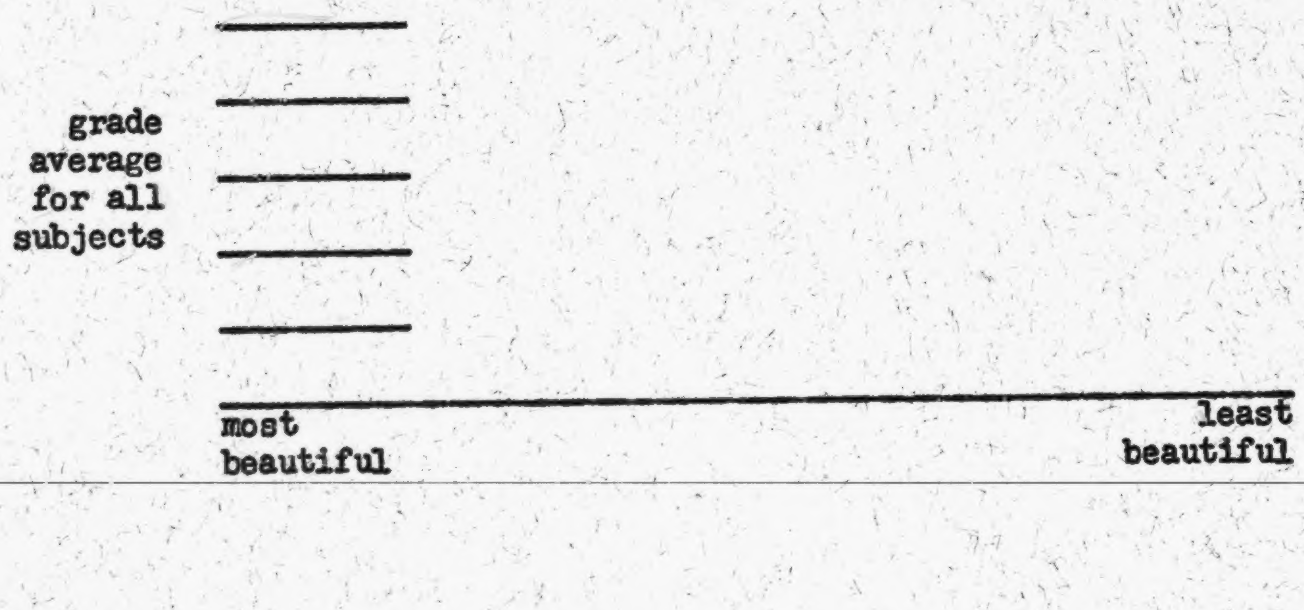
Name	Time to Memorize	Number of Mistakes	
		1st time -	2 weeks later

APPENDIX D

Most beautiful

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________

APPENDIX E



APPENDIX F

My Name ______________________________

Names guessed	Reason

APPENDIX G

Item	Smell	Taste and Feel (Tongue)	Sight	All Senses
Pineapple				
Applesauce				
Apricots				
Boysenberries				
Papaya				

BIBLIO. BOOKS

For discussion purposes only

A SELECTIVE BIBLIOGRAPHY

of

BOOKS FOUND USEFUL

in the

TEACHING OF THE SCIENCE UNITS

for
Grade Three

Correlated to the Unit Titles as found in the
Reorganized Science Curriculum

Minneapolis Public Schools
Science Department
8-24-64

For discussion purposes only

Grade Three

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Introduction to Science

Unit Title	Page	Color
A. Methods of science	1	Gray
B. Tools for measurement of time and direction	3	Gray

I. The Earth

Unit Title	Page	Color
A. Features of the earth's crust	4	Pink
B. How soils are made	5	Pink
C. Water is everywhere	6	Pink
D. Air is everywhere	7	Pink
E. What makes the weather	8	Pink

II. Living Things

Unit Title	Page	Color
A. Things alive	10	Green
B. Animals live in communities	13	Green
C. How animals help us	17	Green
D. How plants depend on their environment	19	Green
E. Protecting and enjoying plants and wildlife	22	Green

For discussion purposes only Grade Three

Unit Title	Page	Color
III. Energy		
B. Sources and uses of heat...........	25	Yellow
C. Mechanical energy....................	26	Yellow
D. Effects of current electricity......	27	Yellow
E. Earth's gravity.....................	28	Yellow
IV. The Universe		
The sun and other stars.................	29	Blue

The annotations for books found on the following pages were obtained from many bibliographies which were consulted in preparation of this list.

Introduction to Science

A. Methods of science	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Challand, Dr. Helen and Elizabeth Brandt. 1963 SCIENCE ACTIVITIES FROM A TO Z ** Children's Press. $5.50	X		Good	
Epstein, Sam and Beryl. 1960 THE FIRST BOOK OF MEASUREMENT * Watts. $2.50 Presents scales and devices by which the world does its measuring.	X			
Podendorf, Illa. 1960 PROJECTS AND EXPERIMENTS ** Children's Press. $4.50 101 Science Experiments with air, magnets, electricity, water, heat, sound, light, machines, chemistry, plants, etc.	X		Good	2-3
Selsam, Millicent E. 1963 GREG'S MICROSCOPE ** Harper. $2.19 Greg, who receives a microscope, makes slides from common objects around the house and is entranced by what he sees. Accurate information simply presented with a touch of humor for the beginning independent reader.	X	X	Excellent	2-3

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three (Addendum)

Addition to Page 2

Introduction to Science

A. Methods of science	Tchr. Ref.	Illus.	Learning Activities	Pupil Interest	Reading Level
Newbury, N. F. and Armstrong, H. A. 1962 THE JUNIOR SCIENTIST * Sterling $3.69 This book is divided into topics with simple experiments for the children to carry out themselves. The discovery method of learning, with emphasis on observation and recording is stressed.	X		Good		
Van Gelder, Richard G. 1964 THE PROFESSOR AND THE MYSTERIOUS BOX ** Harvey House $2.50 What kind of bait attracts skunks? How do you weigh a skunk? Why do farmers like to have skunks around? The children learned the answers to many questions as they helped Professor Hill with his experiments. They found out what was in the box that kept appearing and disappearing so mysteriously, and they discovered interesting things about the work of zoologists and the world of skunks.					3

* Good
** Excellent

Introduction to Science A.(continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Vergara, William C. 1958 SCIENCE IN EVERYDAY THINGS ** Harper. $4.95 Answers to hundreds of interesting and scientific questions.	X			

* Good
** Excellent

Introduction to Science

B. Tools for measurement of time and direction	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Brindze, Ruth. 1949 THE STORY OF OUR CALENDAR ** Vanguard. $3.50 The history of the calendar - why it was made, its uses, necessities for modification, and other interesting facts.	X	X		4

* Good
** Excellent

I. The Earth

A. Features of the earth's crust	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Life, Editorial Staff of, and Lincoln Barnett. 1956 THE WORLD WE LIVE IN ** Simon & Schuster. $4.99 A pictorial description of geological features of the earth, plus much information about the life that survives upon it.	X	X		4 and above

* Good
** Excellent

I. The Earth

B. How soils are made	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Bethers, Ray. 1957 THE STORY OF RIVERS * Sterling. $2.50 A history of rivers and the manners in which they have changed and affected the world.	X	X		Above 4
White, Anne Terry. 1957 ALL ABOUT GREAT RIVERS OF THE WORLD * Random. $1.95 The story of five great rivers, how they have developed, and how they have affected the land and people along their banks.	X	X		

* Good
** Excellent

I. The Earth

C. Water is everywhere

	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Black, Irma S. 1958 BUSY WATER * Holiday. $2.75 Beginning with rain falling on a high hill, text and pictures trace the water cycle to tell where the rain comes from and some of the uses of water.		X		2-3
Graham, Edward H., and William R. VanDersal. 1956 WATER FOR AMERICA: THE STORY OF WATER CONSERVATION ** Walck. $3.75 A survey of the principal uses of water and the importance of its conservation.	X	X		
Schloat, G. Warren, Jr. 1955 THE MAGIC OF WATER ** Scribner. $2.91 An entertaining and educational book about the nature of water.		X	Good	3

* Good
** Excellent

I. The Earth

D. Air is everywhere	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Knight, David C. 1961 THE FIRST BOOK OF AIR: A BASIC GUIDE TO THE EARTH'S ATMOSPHERE ** Watts. $2.50 Contains air experiments for the young reader to do.	X	X	Excellent	
Pine, Tillie S. and Levine, Joseph. 1960 AIR ALL AROUND * Whittlesey House. $2.63 Simple science facts and experiments for youngest readers.	X		Good	2-3

* Good
** Excellent

I. The Earth

E. What makes the weather?

	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Berrill, Jacqueline. 1958 WONDERS OF THE ANTARCTIC ** Dodd. $3.00 Major emphasis of information is on the wildlife of the region: penguins, petrel, albatross, seals, whales, etc.				3-4
Berry, Erik. 1959 MEN, MOSS AND REINDEER * Coward-McCann. $2.95 Life of the Lapps living north of the arctic circle.		X		3-4
Feravolo, Rocco V. 1963 JUNIOR SCIENCE BOOK OF WEATHER EXPERIMENTS * Garrard. $2.50 Gives many weather experiments and directions for making instruments.	X	X	Good	
yler, Rose. 1956 FIRST BOOK OF WEATHER ** Watts. $2.50 The origins and causes of various types of weather. Simple experiments and directions for making weather instruments and maps.	X	X	Good	3-4

* Good
** Excellent

I. The Earth - E (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Zolotow, Charlotte. 1952 THE STORM BOOK * Harper. $2.92 Unusual pictures of the country and the city during a storm ending up with a rainbow. Brief text.				3-4

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three (Addendum)

Addition to Page 9

I. The Earth

E. What makes the weather?	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Larrick, Nancy 1961 RAIN, HAIL, SLEET AND SNOW ** Garrard Press $1.98 A first reader on meteorology, accurate, with simple vocabulary.	X	X		3

* Good
** Excellent

II. Living Things

A. Things Alive	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Buck, Margaret Waring. 1958 PETS FROM THE POND ** Abingdon. $3.00 (paper - $1.75) How to collect and care for creatures to be found in a common pond.	X	X		4 and above
Hyde, Margaret O. 1960 ANIMAL CLOCKS AND COMPASSES * McGraw. $2.96 An absorbing inquiry into the telling of time through the intuitive mechanisms that govern non-human life. Suggestions for observations and inquiry by the reader are included. Winner of the Thomas Alva Edison Award for the best children's science book published in 1960.	X			
Jordan, E. L. 1952 HAMMOND'S NATURE ATLAS OF AMERICA ** Hammond. $4.95 Information on the plants and animals to be found in this country.	X	X		

* Good
** Excellent

II. Living Things - A. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
McClung, Robert. 1957 LUNA, THE STORY OF A MOTH * Morrow. $2.75 Very attractive illustrations and text describe the life cycle of the beautiful pale-green Luna moth.	X	X		3-4
Podendorf, Illa. 1956 THE TRUE BOOK OF ANIMALS OF THE SEA AND SHORE ** Children's Press. $2.00 Many different sea and shore animals are examined.		X		3
Posell, Elsa. 1958 THE TRUE BOOK OF DESERTS ** Children's Press. $2.00 General characteristics of deserts and some of the plants and animals which inhabit them. Many large illustrations and easy-to-read text.		X		3
Selsam, Millicent. 1960 PLENTY OF FISH * Harper. $2.19 The author handles her goldfish and humans with an expert touch and the illustrations are so delightful that the beginner must read every page.		X	Good	2-3

* Good
** Excellent

II. Living Things - A. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Selsam, Millicent E. 1958 SEE THROUGH THE LAKE ** Harper. $2.92 Presents, in a study of a typical lake, basic biological concepts.	X	X		3
Selsam, Millicent E. 1961 TONY'S BIRDS * Harper. $2.19 With help from his father, Tony's interest in bird-watching grows. Good science material for the beginning reader.		X		2-3
Zim, Herbert S. and Lester Ingle. 1955 SEASHORES ** Simon & Schuster. $2.99 (paper - $1.00) A guide to the animals and plants found along the beach.	X	X		

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three
(Addendum)

Additions to
Page 12

II. Living Things

A. Things Alive	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Phleger, Fred 1961 RED TAG COMES BACK ** Harper $1.95 This is the exciting story of a salmon's journey to the sea and her return, years later, to the place of her birth. It is told in simple, concise words that a beginning reader knows and understands. "It illustrates what appear to be the most basic biological necessities -- to get enough to eat, to keep from being eaten, and to reproduce before you die."	X	X		2-3

* Good
** Excellent

II. Living Things

B. Animals live in communities	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Barker, Will. 1956 FAMILIAR ANIMALS OF AMERICA ** Harper. $4.95 A well-written, authoritative guide to the subject.	X	X		
Berrill, Jacquelyn. 1951 WONDERS OF THE SEASHORE ** Dodd. $3.00 Tells about many of the strange animals of the sea.		X		3-4
Blough, Glenn O. 1957 WHO LIVES IN THIS HOUSE? A STORY OF ANIMAL FAMILIES ** Whittlesey. $2.96 An easy-to-read story about the animals that live in and around an old red house. Included are robins, wasps, squirrels, bees, spiders and skunks.	X	X		3
Colby, Carol. 1953 WHO LIVES THERE * Dutton. $1.35 An informative, concise book to aid in identification of animal homes. Illustrations stimulate more careful observation.	X			

* Good
** Excellent

II. Living Things - B. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Goudey, Alice E. 1959 HERE COME THE RACCOONS ** Scribner. $2.75 Describes through a narrative account of one family the life cycle and habits of the raccoon.		X		3-4
Hogner, Dorothy Childs. 1953 EARTHWORMS ** Crowell. $2.90 Describes how earthworms live and how to set up a worm farm.	X	X		3
Jordan, E. L. 1952 HAMMOND'S NATURE ATLAS OF AMERICA ** Hammond. $4.95 Information on the plants and animals to be found in this country.	X	X		
Mason, George F. 1943 ANIMAL TRACKS ** Morrow. $2.75 Means of identifying forty-four common mammals.	X	X		Above 4

* Good
** Excellent

II. Living Things - B. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
McClung, Robert M. 1958 ALL ABOUT ANIMALS AND THEIR YOUNG ** Random. $1.95 How different kinds of animals reproduce and care for their young. Includes examples of "simple" animals as well as insects, birds and mammals.	X	X		4
Phillips, Mary Geisler. 1956 THE MAKERS OF HONEY ** Crowell. $2.50 The anatomy, life cycle, organization, language, and history of the honeybee.	X			
Shannon, Terry. 1958 DESERT DWELLERS ** Whitman. $2.75 Plants and animals on American deserts are described. Excellent illustrations in color and in black and white.	X	X		3
Tibbets, Albert B. 1952 THE FIRST BOOK OF BEES ** Watts. $2.50 Deals with anatomy, making and storing honey, the sting, and the organized colony of honeybees.	X	X		3-4

* Good
** Excellent

II. Living Things - B. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Webb, Addison. 1947 BIRDS IN THEIR HOMES ** Doubleday. $2.95 The stories of many different varieties of birds and the homes they build.	X	X		3-4
Zim, Herbert S. 1952 ALLIGATORS AND CROCODILES ** Morrow. $2.78 Distinguishes between alligators and crocodiles, and describes the geographic distribution, habitat, and food of each.		X		3
Zim, Herbert S. 1955 MONKEYS ** Morrow. $2.78 A well-organized presentation of the three major groups.	X	X		3-4

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three (Addendum) Additions to Page 16

II. Living Things

B. Animals live in communities	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Gibson, Gertrude Hevener 1963 ABOUT INSECTS THAT HELP PLANTS * Melmont $2.50 Instructs children about the ways of digging, hunting and pollen-carrying insects.	X	X		3-4
Tannenbaum, Harold and Stillman, Nathan 1960 ANIMALS AND WHERE THEY LIVE Webster 69¢ This book contains simple, but accurate information about a number of animals and their habitats. The vocabulary is very simple and the pictures are colorful.	X	X		3

* Good
** Excellent

II. Living Things

C. How animals help us	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Adrian. 1955 GRAY SQUIRREL ** Holiday. $2.75 Life cycle of a gray squirrel and its role in conservation simply told and illustrated.	X	X		3
Barker, Will. 1956 FAMILIAR ANIMALS OF AMERICA ** Harper. $4.95 A well-written, authoritative guide to the subject.	X	X		
Blough, Glenn O. 1955 LOOKOUT FOR THE FOREST * Whittlesey. $2.96 Easy to read, attractively illustrated presentation of forest conservation. Shows how trees grow, how they are protected, and their importance to man.		X		3
Lavine, Sigmund A. 1958 WONDERS OF THE HIVE * Dodd. $3.00 A study of the structure, social habits, and usefulness of bees. Emphasis is on the honeybee.	X	X		

* Good
** Excellent

II. Living Things - C. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Osmond, Edward. 1957 ANIMALS OF THE WORLD, Vol. II * Oxford. $3.00 The distribution, natural history and importance to man of kangaroos, reindeer, beavers, and whales are described and illustrated by pen drawings.	X			
Phillips, Mary Geisler. 1956 THE MAKERS OF HONEY ** Crowell. $2.50 The anatomy, life cycle, organization, language, and history of the honeybees.	X			
Posell, Elsa. 1961 THE TRUE BOOK OF DOGS * Children's Press. $2.00 Many drawings show the characteristics of different breeds of dogs. The text explains how hunting dogs are used and the work done by some dogs. The last few pages give directions for proper care of pet dogs.		X		2-3
Tibbets, Albert B. 1952 THE FIRST BOOK OF BEES ** Watts. $2.50 Deals with anatomy, making and storing honey, the sting, and the organized colony of honeybees.	X	X		3-4

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three (Addendum) Additions to Page 18

II. Living Things

C. How animals help us	Tchr. Ref.	Illus.	Learning Activities	Pupil Interest	Reading Level
Atkin, J. Myron and Will Burnett 1961 WORKING WITH ANIMALS ** Holt, Rinehart, Winston $1.50 This is a source booklet of activities about animal life for elementary school teachers. Each activity has been selected to help children in the elementary school arrive at a basic understanding of how animals live and how they behave. The emphasis in this booklet is on activities--science work that children can try out, feel, see, touch.	X				

* Good
** Excellent

II. Living Things

D. How plants depend on their environment

	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Barker, Will. 1956 FAMILIAR ANIMALS OF AMERICA ** Harper. $4.95 A well-written, authoritative guide to the subject.	X	X		
Blough, Glenn O. 1959 SOON AFTER SEPTEMBER ** Whittlesey. $2.84 Tells about plants and animals living during the winter where winters are cold and summers warm.		X		3
Cooke, Emogene. 1960 FUNTIME WINDOW GARDEN ** Children's Press. $2.50 Growing plants in water and growing plants in soil are both discussed. Each suggested activity is outlined under headings such as, What you Do, What to Watch For, and Things To Do.	X	X	Good	3
Guilcher, J. M. and R. H. Noailles. 1960 A TREE IS BORN ** Sterling. $2.99 Follows development from seed of the horse chestnut, oak, walnut and pine.	X	X		

* Good
** Excellent

II. Living Things - D. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Jordan, E. L. 1952 HAMMOND'S NATURE ATLAS OF AMERICA ** Hammond. $4.95 Information on the plants and animals to be found in this country.	X	X		
Kirkus, Virginia. 1956 THE FIRST BOOK OF GARDENING ** Watts. $2.50 Helpful information on where and when to grow various plants.	X	X	Good	3
Rosner, Joan. 1959 LET'S GO FOR A NATURE WALK * Putnam. $1.86 Describes an imaginary trip for the purpose of learning about trees, wildflowers, insects and rocks.		X	Good	3
Russell. 1958 TREES FOR TOMORROW * Melmont. $2.00 Stresses importance and use of trees. Relates what is being done in wise conservation of trees.	X	X		3

* Good
** Excellent

II. Living Things - D. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Selsam, Millicent E. 1958 SEE THROUGH THE LAKE ** Harper. $2.92 Exploration of the community of plants and animals that live at different levels in a lake.	X	X		3
Selsam, Millicent E. 1959 SEEDS AND MORE SEEDS * Harper. $2.19 Benny learns by experimentation and observation what seeds are, how they grew, where they come from, and how they are dispersed.		X	Good	3
Shannon, Terry. 1958 DESERT DWELLERS ** Whitman. $2.75 Plants and animals on American deserts are described. Excellent illustrations in color and in black and white.	X	X		3
Zim, Herbert. 1952 WHAT'S INSIDE OF PLANTS ** Morrow. $2.50 A picture book for children and adults. The large type for children, the small type explanation for the teacher. It includes such plants as beans, carrots, corn and tomatoes.	X	X	Good	3

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three
(Addendum)

Additions to
Page 21

II. Living Things

D. How plants depend on their environment	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Blane, Gertrude 1965 FLOWER BOX MYSTERY * Melmont Pub. Co. $2.00 This book is a thrilling story with pictures; valuable in elementary science programs for its information about growing plants in the city; conditions essential for plant life; and the economic value of plants.			X	3-4

* Good
** Excellent

II. Living Things

E. Protecting and enjoying plants and wildlife

	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Allen, Gertrude. 1963 EVERYDAY BIRDS * Houghton. $2.23 This book tells simple facts about six common birds -- robins, crows, chicadees, woodpeckers, ducks and wrens. The pictures are large and clear and will help give a child the fun of recognizing them.		X		2-3
Blough, Glenn O. 1956 AFTER THE SUN GOES DOWN: THE STORY OF ANIMALS AT NIGHT * Whittlesey. $2.96 Describes the night activities of whippoorwills, screech owls, flying squirrels, opossums, bats, tree crickets, katydids, moths, fireflies, frogs and beavers. Colorful drawings by Jeanne Bendick.		X		3
Cruikshank. 1956 WONDERS OF THE BIRD WORLD * Dodd. $3.00 Informal, authentic information about first birds, structure of birds, flight, migration, bird banding, habitats, nesting, feeding, collecting nests and the need for bird conservation.	X			

* Good
** Excellent

II. Living Things - E. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Green, Ivah. 1955 ANIMAL MASQUERADE ** Coward-McCann. $3.00 Full-page photographs on every other page show the animals and the text describes how the "masquerade" features are of value to the animals. An excellent reference on adaptations.		X		3-4
Green, Ivah. 1960 WILDLIFE IN DANGER * Coward-McCann. $3.50 Photographs and brief text describe North American birds and animals which are already extinct or threatened with extinction and what is being done or can be done to preserve those still in existence.	X	X		
Johnson, H. N., and A. H. Poatgeiter. 1957 OUTDOORS: ADVENTURES IN CONSERVATION * Houghton. $2.92 Covers all phases of conservation - water pollution, balance in nature, soil conservation, flood control, conservation of wildlife, tree farming, etc.	X	X		3-4

* Good
** Excellent

II. Living Things - E. (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Jordan, E. L. 1952 HAMMOND'S NATURE ATLAS OF AMERICA ** Hammond. $4.95 Information on the plants and animals to be found in this country.	X	X		
Smith, F. C. 1954 THE FIRST BOOK OF CONSERVATION * Watts. $2.50 An imaginatively written account of how rivers, lakes, forests, wildlife, the green growing plants, and the earth, all depend on nature's intricate interrelationships.				3-4
Webber, Irma E. 1952 THANKS TO TREES * * Scott. $2.75 Stresses conservation of trees and explains their ecology.	X			3

* Good
** Excellent

II. Living Things

E. Protecting and enjoying plants and wildlife

	Tchr. Ref.	Illus.	Learning Activities	Pupil Interest	Reading Level
Graham, Edward 1949 WILDLIFE FOR AMERICA: The Story of Wildlife Conservation * Walck $3.00 In clear text, with photographs on every page, wildlife conservation is discussed, explaining how and why American wildlife has changed since primitive times, the important part wildlife plays in the economic, recreational and esthetic life of America, and what can and must be done to preserve and improve it.	X				
Nasca, Donald and Glenn Sprague 1964 THE GREEN GIANTS * F. A. Owen Pub. Co. $1.90 Shirley discovers facts about the tree kingdom as she travels across the U. S. A. Leaves, seeds, types of trees are learned. A tree mystery game develops outdoor identification skills.	X	X			3-4

* Good
** Excellent

II. Living Things

F. Our bodies at work	Tchr. Ref.	Illus.	Learning Activities	Child Use
Hinshaw, Alice 1959 YOUR BODY AND YOU ** Children's Press $2.50 Simple text and illustrations explain the structure and function of the human body.		X		3

* Good
** EXCellent

III. Energy

B. Sources and uses of heat	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Epstein, Sam, and Beryl Epstein. 1955 THE FIRST BOOK OF GLASS * Watts. $2.50 Explains how glass is made and used, and relates the history of glass.	X	X		
Feravolo, Rocco V. 1964 JUNIOR SCIENCE BOOK OF HEAT ** Garrard. $2.50 Simple demonstrations and experiments.			Good	3-4

* Good
** Excellent

III. Energy

B. Sources and uses of heat	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Tannenbaum, Harold and Stillman, Nathan 1960 FIRE AND HOW IT IS USED * Webster 69¢ This book contains a concise explanation of fire, its uses and control. A good resource for teaching fire safety.		X	X	3

* Good
** Excellent

III. Energy

C. Mechanical energy	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Meyer, Jerome Sydney. 1958 MACHINES * World. $2.73 The wheel and axle, the lever, the screw and the wedge explained in easy-to-read or understand terms and clear black and white drawings.	X			

* Good
** Excellent

III. Energy

D. Effects of current electricity	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Feravolo, Rocco V. 1960 JUNIOR SCIENCE BOOK OF ELECTRICITY ** Garrard. $2.50 Basic principles and uses of static and current electricity are explained through simple experiments that a child can do himself.	X	X	Good	3-4
Tannenbaum & Stillman. 1960 ELECTRICITY AND HOW IT IS MADE ** Webster. 76¢ A good presentation of how electricity is made plus the all-important suggestions for how to make some electricity ourselves and "discover" other things about electricity.	X	X	Good	3-4

* Good
** Excellent

III. Energy

E. Earth's gravity	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Tannenbaum & Stillman. 1960 WE READ ABOUT ROCKETS * Webster. 76¢ Explanations of principles of thrust, rocket shapes, and fuels.		X	Good	3-4

* Good
** Excellent

IV. The Universe

The sun and other stars	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Branley, Franklyn M. 1959 A BOOK OF SATELLITES FOR YOU ** Crowell. $3.36 How man sends up satellites, what he hopes to learn from the messages they send back to earth, and how these messages are sent.		X		2-3
Crosby, Phoebe. 1960 JUNIOR SCIENCE BOOK OF STARS ** Garrard. $2.50 A fine introductory book written with a reverence for the order and beauty of the universe. Contains a final suggestion to try an "over-night" look at stars and how they change through the night.	X	X		3-4
Greene, Carla. 1961 I WANT TO BE A SPACE PILOT ** Children's Press. $2.00 Gravity, escape velocity, astronaut training, the moon, and space are discussed.		X		2-3
Greenhood, David. 1961 WATCH THE TIDES * Holiday. $2.75 Story of the tides, high and low - how they look; what they do; and how they are made.	X			3

* Good
** Excellent

IV. The Universe

The sun and other stars (continued)	Tchr. Ref.	Illus.	Learning Activities	Reading Level
Holsaert, Eunice. 1959 A BOOK TO BEGIN ON OUTER SPACE * Holt, Rinehart & Winston. $2.57 Explores the possibilities of space travel, clothing equipment, building a space station, and exploration of other planets.		X		2-3

* Good
** Excellent

SCIENCE RESOURCE BOOK BIBLIOGRAPHY - Grade Three (Addendum)

Addition to Page 30

IV. The Universe

The sun and other stars	Tchr. Ref.	Illus.	Learning Activities	Pupil Interest	Reading Level
Rey, H. A. 1962 THE STARS: A NEW WAY TO SEE THEM * Houghton-Mifflin $6.00 Guide to the constellations for beginners. Jacket unfolds into 22 x 26 inch map.	X	X			

* Good
** Excellent

Grade Three

BASIC SCIENCE EDUCATION SERIES
Published by Row, Peterson & Co.

(Grade Placed for Major Topic in the Reorganized Science Curriculum)

	Reading Level
I. The Earth	
D. Air is everywhere	
The Air About Us	3.5
E. What makes the weather?	
Clouds, Rain and Snow	3.5
Thermometers, Heat and Cold	3.8
II. Living Things	
A. Things alive	
An Aquarium	2.7
B. Animals live in communities	
Animals of the Seashore	3.8
Animals That Live Together	1.9
Fishes	3.8
Plant and Animal Partnerships	3.3
Reptiles	3.9
Spiders	3.4
Toads and Frogs	3.2
C. How animals help us	
The Pet Show	3.2
Useful Plants and Animals	3.2
D. How plants depend on their environment	
Flowers, Fruits, Seeds	3.8
Seeds and Seed Travels	3.3
Animals of the Seashore	3.8
E. Protecting and Enjoying plants and wildlife	
Animal Travels	3.8

Basic Science Education Series (continued)

	Reading Level
E. Protecting and enjoying plants and wildlife	
Birds	3.8
Birds in the Big Woods	2.1
Birds in Your Back Yard	-
Gardens Indoors	3.3
The Insect Parade	3.1
Living Things	2.9
Pebbles and Sea Shells	3.0
Saving Our Wildlife	3.3
Six Legged Neighbors	-
III. Energy	
E. Earth's gravity	
Gravity	3.2
IV. The Universe	
A. The sun and other stars	
How the Sun Helps Us	2.4
The Sky Above Us	3.5

JLP/db
10/18/67

BIBLIO. FILMS

For discussion purposes only

A PARTIAL LISTING OF PRESENTLY OWNED

SCIENCE MOTION PICTURE FILMS

GRADE THREE

Correlated to the Unit Titles as found in the
Reorganized Science Curriculum

Minneapolis Public Schools
Science Department
3-12-65

TABLE OF CONTENTS

Unit Title	Page Number	Color
Introduction to Science		
A. Methods of science	1	Gray
B. Tools for measurement of time and direction	3	Gray
I. The Earth		
C. Water is everywhere	5	Pink
E. What makes the weather?	6	Pink
II. Living Things		
A. Things alive	7	Green
B. Animals live in communities	9	Green
C. How animals help us	15	Green
D. How plants depend on their environment	17	Green
E. Protecting and enjoying plants and wildlife	18	Green
F. Our bodies at work	22	Green
III. Energy		
B. Sources and uses of heat	23	Yellow
C. Mechanical energy and simple machines	23A	Yellow
D. Effects of current electricity	24	Yellow
E. Earth's gravity	25	Yellow
IV. The Universe	27	Blue

The annotations for films found on the following pages were obtained in most cases from the Library of Congress Cards. Some annotations were secured from other sources such as the Educational Film Guide and producers' catalogs.

Introduction to Science

A. Methods of science

Name and Description of Film	Other Grade Placements	Remarks
1. Big World ** Educ. Horizons, 1960; 11 min., color Shows how we cannot always know the shape of an object by viewing only a small part of it. Answers the simple, direct questions of a child about the size and shape of our world. A primary globe is used by the child's father to discuss briefly the basic forms of land and water.	K - ** Gr. 1 - * Gr. 5 - *	1st semester Simple
2. Children in Winter ** EBF, 1958; 11 min. Two children enjoy winter scenes and activities, playing in the snow with their dog, investigating nature in their back yard and around the house, checking the temperature, and observing the waning of the day with its accompanying play of shadows.	K - *	
3. Our World of Science ** EBF, 1956; 10 min. Introduces and defines the words science experiment, and demonstrates a simple experiment. Develops the idea of an orderly universe and shows a working procedure for problem solving in science.	K - **	

* Good
** Excellent

Introduction to Science - A. (continued)

Name and Description of Film	Other Grade Placements	Remarks
4. Prove it With a Magnifying Glass ** 11 min., color $120, b/w $60, Film Associates of Calif. This film is designed as an introduction to the scientific method. This film was made for the young child. It uses a child's first science experiences with a simple instrument (the magnifying glass) to illustrate the concept: prove it yourself. For primary science classes.	K - ** Gr. 1 - ** Gr. 2 - **	
5. Ways to Find Out ** Churchill-Wexler, 1957; 12 min. Vino, a boy of about eight years, discovers that there are many ways to learn about things. Walking home in the rain, he sees, hears, feels, tastes, and smells many things. At home he distinguishes between things, such as a ball and an apple, by using his senses. He can sense a kitten by its sound, a rug by its feel, soap and pickles by their smell, and an orange by its taste.	K - ** Gr. 1 - **	
6. What the Frost Does: Background for Reading and Expression ** Coronet, 1960; 10 min., color In guiding children to make observations of events in nature, the film shows seasonal changes and the effects of frost in an engaging story of a boy and his interest in a pumpkin that is growing in his father's field.	K - ** Gr. 1 - **	Show in fall

* Good
** Excellent

Introduction to Science

B. Tools for measurement of time and direction

Name and Description of Film	Other Grade Placements	Remarks
1. The Calendar: Days, Weeks, Months * Coronet, 1954; 11 min. The arrival of a circus motivates a primary school pupil to learn about the calendar. His mother explains the meaning of the numbers on the calendar; and when he goes to bed that night, he dreams about a circus clown who instructs him further. The next day at school he learns about the months, weeks, and days.		
2. How to Measure Time ** EBF, 1961; 10 min., color A boy discovers that when he is bored, time moves slowly, but when he is excited, time goes by rapidly. We examine a pendulum clock, a wrist watch, the boy's heart beat, the rhythm of a jazz combo, the earth's circling the sun, the earth turning on its axis as periods of time. The stop watch is used to time a high hurdles race and electronic timers are introduced.	Gr. 6 - * Gr. 5 - **	

* Good
** Excellent

I. The Earth

C. Water is everywhere

Name and Description of Film	Other Grade Placements	Remarks
1. A Visit to the Waterworks * EBF, 1956; 11 min. Shows an elementary school class being taken on a tour of the local waterworks. Demonstrates how water is pumped in, chemically treated, filtered, and tested before it is piped to houses and buildings of the town. Points out major water supply sources and illustrates various uses of the community water supply.	Gr. 4 - * Gr. 7 - *	With prep.

* Good
** Excellent

I. The Earth

E. What makes the weather?

Name and Description of Film	Other Grade Placements	Remarks
1. How Weather is Forecast * Coronet, 1953; 11 min. Shows the operation of a weather observation station and a weather forecasting station; describes the instruments used in weather forecasting and their functions; explains the importance of forecasting to various occupational groups and to the inhabitants of flood areas. Animated sequences are used to show the charting of a weather map and to explain the symbols used.	Gr. 5 - ** Gr. 8 - **	A little diff.
2. Rain ** 10 min., color, $110, International Film Bureau Inc. The importance of water (rain) to plant life. Evaporation and condensation are introduced during a visit to a laboratory where a child is doing some individual experimentation. Pictures and discussion point up the effects of wind and sunshine on evaporation. Cloud formation, rainbows and showers add to the interest of the film. For Primary Grades	Gr. 2 -	No eval. yet
3. Whatever the Weather * Educ. Horizons, 1960; 10 min., color This film gives an esthetic appreciation of the different weather changes and it teaches weather facts. Accompanying record for this film.		

* Good
** Excellent

Additions to
Page 5

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

I. The Earth

C. Water is everywhere

Name and Description of Film	Other Grade Placements	Remarks
Water and What it Does EBF (Basic Physical Science), 1962; 11 min., color Some basic concepts about the nature and properties of water are illustrated. The dissolving property of water is demonstrated by adding sugar to it. Evaporation is illustrated by watching clothes drying outdoors and by seeing water vapor rise from a teakettle. Condensation and expansion of water is demonstrated. A balloon stretched over the neck of a flask expands as water is heated and vapor (or gas) is formed. A locomotive, driven by the force of expanding water vapor, shows the power of steam and some of its uses.	Gr. 6 - ** Gr. 7 - **	No eval. yet

* Good
** Excellent
4-5-66

I. The Earth

E. What makes the weather?

Name and Description of Film	Other Grade Placements	Remarks
Weather For Beginners **		
Coronet, 1964; 10 min., color		
Illustrates the roles of the sun, air, and water in causing changes in weather. Shows how clouds are formed, and what causes rain. Explains why air above land gets warmer and what causes wind. Stresses that when weather changes, it's really the air that changes.		
What Makes Clouds? *	Gr. 5 - ** Gr. 8 - **	
EBF; 1965; 19 min., color		
Presents a close look at fog and clouds. Shows that clouds are formed by droplets of water. Explains where this water comes from. Discusses evaporation and transpiration as sources of invisible water vapor. Shows laboratory experiments with condensation. Describes how condensation occurs in nature. Shows the differences between clouds and rain.		

* Good
** Excellent
4-28-67

II. Living Things

A. Things alive

Name and Description of Film	Other Grade Placements	Remarks
1. Aquarium Wonderland ** Pat Dowling, 1960; 10 min., color In microscopic and unusual close-up scenes and animation, one sees how fish breathe, hear, feel, smell and swim. A boy shows how to set up and maintain an aquarium, using the proper amount of water, plants and food for the goldfish and other animal life it contains.	Gr. 1 - ** Gr. 4 - ** Gr. 5 - **	
2. Balanced Aquarium ** EBF, 1955; 11 min. Follows the step-by-step activities of two elementary school children who become interested in fish and study the problems involved in keeping tropical fish. They set up an aquarium, select the fish, and learn the importance of feeding fish properly, cleaning the aquarium, keeping the temperature constant, and maintaining the proper balance between plant and fish life. Live action, animated drawings, and underwater photography.		Also listed II-B
3. How Plants Reproduce ** 10 min., color $125, b/w $60, McGraw-Hill Book Co. A simple explanation of how plants reproduce: the function and parts of the flower, the fruit and the seed.	Gr. 5 - **	
4. How Seeds are Scattered ** 10 min., color $125, b/w $60, McGraw-Hill Book Co. Discusses and illustrates the many different ways in which seeds are dispersed, by wind, water and animals.	Gr. 5 - **	

* Good
** Excellent

II. Livings Things - A. (continued)

Name and Description of Film	Other Grade Placements	Remarks
5. What's Alive ** Film Assoc. of Calif., 1962; 10 min., color Helps the student toward an understanding of the activities that distinguish living from non-living things. Defines living things in terms of a set of activities. This print shows that only a thing that can move, respond, change fuel into energy, reproduce and grow can be said to be "alive".	Gr. 4 - ** Gr. 5 - ** Gr. 7 - **	

* Good
** Excellent

II. Livings Things

B. Animals live in communities

Name and Description of Film	Other Grade Placements	Remarks
1. Andy's Animal Alphabet * McGraw-Hill, 1950; 10 min., color Shows Andy, the Zoo's little orangutan, on a guided tour through the Bronx Zoo, visiting a series of familiar and strange animals whose names begin with different letters of the alphabet.	K - **	
2. Balanced Aquarium ** EBF, 1955; 11 min., Follows the step-by-step activities of two elementary school children who become interested in fish and study the problems involved in keeping tropical fish. They set up an aquarium, select the fish, and learn the importance of feeding the fish properly, cleaning the aquarium, keeping the temperature constant, and maintaining the proper balance between plant and fish life. Live action, animated drawings, and underwater photography.		Also listed II-A
3. Birds of the Inland Waterways ** Coronet, 1946; 11 min., color Presents various birds of inland waterways in their native habitats. Shows the belted kingfisher, the glossy ibis, avocet, red-backed sandpiper, Canada goose, lesser scaup duck, and several members of the heron family.	Gr. 7 - **	

* Good
** Excellent

Living Things - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
4. Birds of the Seashore ** EBF, 1951; 11 min., color Portrays the activities, habitats, and distinguishing marks of various North American water birds. Depicts gulls in flight and nesting in colonies; gannet colonies on Bonaventure Island; eider ducks in the St. Lawrence estuary; and the black guillemot, blue heron, razor-billed auk, and cormorant. Includes bird calls.	K - ** Gr. 5 - * Gr. 7 - *	
5. Children in Autumn ** EBF, 1958; 11 min. A young boy and his sister observe such signs of autumn as the gradual change from the green of summer to the brown and red color of autumn, the changes in the animal world, the days growing shorter, and the weather becoming cooler.		
6. Earthworms ** Pat Dowling, 1957; 11 min., color Shows how the earthworm, after emergence from the cocoon, eats its way through earth, digests food, and brings castings to the surface. Explains how the earthworm forms tunnels that help to aerate and enrich the soil and carry water to plant roots.	Gr. 4 - ** Gr. 5 - ** Gr. 7 - **	

* Good
** Excellent

Living Things - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
7. Learning From Pets in the Classroom ** Journal Films, 1962; 15 min., color What do children learn by watching and taking care of pets in the classroom? Several schools are visited in this film where children are feeding and taking care of animals, watching them, and learning from them. Children taking care of frogs, toads, salamanders, caterpillars, etc.	Gr. 4 - *	
8. Life Along the Waterways ** EBF, 1952; 11 min., color Shows the variety of environmental conditions in a changing waterway. Includes scenes of animal and plant life found in streams, ponds, rivers, and marshes.	Gr. 3 - Gr. 4 - ** Gr. 7 - *	Also listed II-D
9. Life in a Garden ** McGraw-Hill, 1960; 13 min., color Shows common forms of animal life found in and near flower gardens. Uses views of flowers, plants, trees and a water hole to show the environment and habitat. Demonstrates that animals eat and are eaten. Pictures such animals as the snail, slug, chipmunk, salamander, snake, toad, and several kinds of birds and insects, mentioning some interesting or peculiar fact about each.	Gr. 4 - **	

* Good
** Excellent

Living Things - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
10. Little Animals ** Pat Dowling, 1959; 11 min., color A variety of small animals beginning with a kitten and carrying through to microscipic animals demonstrate three characteristics of life: movement, feeling, and eating. The relationship and similarities of the various types of animals in life pattern is brought out. A young boy and girl set the scene for discovering these animals.	Gr. 4 - * Gr. 5 - *	Easy film
11. Mammals of the Countryside ** Coronet, 1947; 11 min. Explores the habits and characteristics of countryside mammals--beaver, fox, mink, skunk, opossum, and others. Illustrates, through natural-action shots, how some are helpful and others harmful to the farmer.	Gr. 4 - **	
12. The Robin * Heidenkamp, 1946; 10 min., color Depicts the life story of the robin from the time it arrives in the North in early spring. Shows nest building, eggs in the nest, feeding and care of the young, preening of feathers, etc.	K - ** Gr. 2 - * Gr. 5 - **	Must do own narration Diff. vocab.
13. Spotty: Story of a Fawn ** Coronet, 1950; 11 min. The adventures of Spotty, a wild fawn, as he discovers other animals in the forest. Includes devices for classroom participation.	K - ** Gr. 4 - **	

* Good
** Excellent

Living Things - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
14. The Tree ** Dimension Films. Released by Churchill Films, 1963. 10 min., sd., color, 16 mm. Describes the beauty of trees and their importance to birds, insects, other plants, animals, and people. Introduces the concept that living things depend on each other.	Gr. 1 - ** Gr. 4 - **	
15. Wonders in a Country Stream ** Churchill-Wexler, 1949; 11 min., color Several inhabitants of a mountain stream and their life habits. Two children explore the stream and discover a baby snapping turtle, a baby frog, a salamander, a caddis-fly, a damsel fly and other common animals.	Gr. 4 - **	
16. Zoo ** EBF, 1949; 11 min., color A visit to the Chicago Zoological Park, showing some of the animals found there, their characteristics, their unique coloration, and their feeding habits.	K - ** Gr. 1 - **	
17. Zoo Animals of Our Storybooks: Background for Reading and Expression * Coronet, 1953; 10 min. Pictures a variety of animals in the zoo.	K - ** Gr. 1 - **	

* Good
** Excellent

Living Things - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
18. Zoo Baby Animals * EBF, 1960; 11 min., color Through this film children have an opportunity to look "behind the scenes" at the zoo -- to see activities in the kitchen and hospital; to see how baby animals are fed and cared for by their keepers. The film also shows many animals in attractive outdoor settings and in "children's zoo" sections in the famous Lincoln Park and Brookfield Zoos of Chicago.	K - ** Gr. 1 - **	

* Good
** Excellent

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

Additions to
Page 14

II. Living Things

B. Animals live in communities

Name and Description of Film	Other Grade Placements	Remarks
Animals at Night EBF; 1964; 11 min., color Presents a visual study of various nocturnal animals. Highlights their physical characteristics, habits and adaptations to their nighttime environment.		No eval. yet
	Gr. 1 -	No eval. yet

* Good
** Excellent
5-9-67

II. Living Things

C. How animals help us

Name and Description of Film	Other Grade Placements	Remarks
1. Care of Pets ** EBF, 1944; 11 min., black & white Demonstrates, by means of dramatized situations, the care of various common household pets. Considers the requirements of canaries, tropical fish, cats, and dogs, and explains the necessity for proper food, cleanliness, grooming, and training. Depicts children caring for their pets at home, and stresses the idea that proper care makes for healthy, happy pets.	K - **	
2. Elephants * EBF, 1940; 11 min., black & white Portrays the characteristics and training of domesticated elephants, describing the animals' physical features, food, and methods of eating, drinking and bathing. Shows an adult elephant performing for a circus buyer and young elephants learning to stand on their front and hind legs, to sit on barrels, to walk planks, to ring bells, and to obey other commands.	K - **	
4. How Animals Help Us ** McGraw-Hill, 1960; 11 min., color Illustrates how animals help man to secure the necessities of life, including food, clothing, and labor in producing other things. Pictures various helpful animals on a farm including cows, horses, turkeys, chickens, minks, and a dog, and tells of the ways in which they are helpful to man. Uses the theme of a boy who tries to find a useful job on the farm for a kitten which he wants to keep as a pet.	Gr. 4 - **	

* Good
** Excellent

Living Things - C. (continued)

Name and Description of Film	Other Grade Placements	Remarks
5. Our Foster Mother, The Cow * Frith, 1943; 11 min., color Portrays the happenings on a dairy farm. Emphasizes the importance of milk, and the service of cows to mankind.	Gr. 4 - **	

* Good
** Excellent

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

Additions to
Page 16

II. Living Things

C. How animals help us

Name and Description of Film	Other Grade Placements	Remarks
How Animals Help Us ** McGraw-Hill; 1956; 11 min., color Presents the close relationship between animals and man. Depicts how animals help determine the history of our earth. Shows how animals are used for food, clothing, to build and enrich the soil, to combat our natural enemies, for research, to entertain us and to provide companionship. Describes many of the by-products of animals: leather, silk, soap, feathers, coral, ivory, perfume, furs, glue and wool.		

* Good
** Excellent
5-9-67

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

Additions to
Page 17

II. Living Things

D. How plants depend on their environment

Name and Description of Film	Other Grade Placements	Remarks
How Plants Help Us		No eval. yet
McGraw-Hill; 1957; 12 min., color	Gr. 2 - ** Gr. 4 - *	

Explains that most of the plants help us in some way or other. Illustrates that plants are used as foods for animals and man. Shows how plants are used for other essential materials needed for all of us. Stresses the interdependance theme.

* Good
** Excellent
5-9-67

II. Living Things

D. How plants depend on their environment

Name and Description of Film	Other Grade Placements	Remarks
1. Learning About Seeds ** EBF, 1961; 11 min., color Explains that there are many different kinds of seed-bearing plants and that seeds have many sizes, shapes, and colors. Through time-lapse photography we see how seeds grow and what they need for growth. Several methods of seed dispersal are also clearly illustrated.	K - ** Gr. 1 - ** Gr. 5 - **	
2. Life Along the Waterways ** EBF, 1952; 11 min., color Shows the variety of environmental conditions in a changing waterway. Includes scenes of animal and plant life found in streams, ponds, rivers, and marshes.	Gr. 4 - ** Gr. 7 - *	Also listed II-B
3. Seasonal Changes in Trees ** Coronet, 1949; 11 min., black & white Children study the common trees near their school and note the seasonal changes which occur in the different varieties.	Gr. 1 - ** Gr. 4 - ** Gr. 7 - **	
4. Wonders of Plant Growth ** Churchill-Wexler, 1960; 10 min., color A girl and a boy experiment with plants. They grow plants from a bean and a squash seed, the stem of a geranium, the leaf of a succulent, and the root of a sweet potato plant. Growth is shown in time-lapse photography. Other experiments with plants which children can perform are indicated.	Gr. 2 - ** Gr. 5 - **	

* Good
** Excellent

II. Living Things

E. Protecting and enjoying plants and wildlife

Name and Description of Film	Other Grade Placements	Remarks
1. Bird In Your Backyard ** Barr Productions, 1950; 11 min., color Two brothers share the fun and responsibility of a project to attract birds to their backyard. They make a feeding tray and observe the birds that come to feed; clean and refill a bird bath and learn the drinking and bathing habits of the bird visitors; discover a towhee nest, watch the eggs hatch, observe the parent birds care for their babies, and later see the young birds leave the nest.	Gr. 2 - ** Gr. 5 - ** Gr. 7 - **	
2. Birds of the Dooryard ** Coronet, 1954; 11 min. Presents birds which build their nests in gardens and near homes--robins, yellow warblers, eastern phoebes, yellow-shafted flickers, cardinals, swallows, house wrens, and purple martins. Describes the differences among these birds, their ways of protecting their nests and feeding their young, and ways in which they can be encouraged to nest around houses.	K - ** Gr. 2 - ** Gr. 5 - ** Gr. 7 - **	Adv. vocab.
3. Birds of Our Storybooks ** Coronet, 1954; 12½ min. Scenes of birds in their natural habitats and in book illustrations describe the nesting, feeding, song, color, and song characteristics of a number of common birds. Interest is enhanced with poems and suggested activities such as finding and telling stories about birds and drawing pictures. Birds described are the robin, cardinal, crow, owl, sparrow, blue jay, redheaded woodpecker, wren, and sea gull.	K - **	

* Good
** Excellent

Additions to
Page 17

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

II. Living Things

D. How plants depend on their environment

Name and Description of Film	Other Grade Placements	Remarks
How Plants Help Us		No eval. yet
	Gr. 4 -	No eval. yet
McGraw-Hill, 1957; 12 min., color		
Explains that most of the plants help us in some way or other. Illustrates that plants are used as foods for animals and man. Shows how plants are used for other essential materials needed for all of us. Stresses the interdependence theme.		

* Good
** Excellent
4-6-66

Living Things - E. (continued)

Name and Description of Film	Other Grade Placements	Remarks
4. Blooming Desert (Flowering Desert) * Guy D. Haselton Prod., 1947; 11 min., color Close-up photographs of wild flowers in the deserts of western United States. Musical score throughout.	K - * Gr. 4 - * Gr. 7 - **	Needs prep.
5. Bushy, the Squirrel: Background for Reading and Expression ** Coronet, 1957; 11 min. Shows a young boy and his father setting off to find a squirrel which has scampered away, what they discover in the weeds, and how they make friends with the squirrel.	K - **	
6. Cultivate Your Garden Birds ** U of M, 1950; 10 min., color Presents close-up photographs of colorful garden birds, and offers specific suggestions on how to attract birds to the area.		
7. The Hunter and the Forest ** EBF, 1955; 8 min., black & white A nature allergory in which a Swedish hunter stalks and kills a game bird. When spring returns he goes to the forest again. He sights a family of deer, but decides he cannot kill them. Depicts the man's reactions to the changing seasons and the natural beauties of the forest.	Gr. 4 - *	

* Good
** Excellent

Living Things - E. (continued)

Name and Description of Film	Other Grade Placements	Remarks
8. Insect Zoo ** EBF, 1950; 10 min., color Two children make an insect zoo in their yard and study the characteristics of the katydid, cricket, butterfly, milkweed bug, ladybird beetle, ant, and praying mantis. Shows by means of close-up photography the distinguishing features of each insect, and depicts simple homes which can be made for insects in an exhibit.	Gr. 5 - **	
9. Learning About Flowers ** EBF, 1958; 10 min., color Portrays in vivid photography the story that there are many different kinds of flowering plants. Time-lapse photography is extensively used to show the opening of some of the more common flowers of our fields and gardens. The film is designed to help the student appreciate the beauty in flowers and to realize that the purpose of the flower is to produce seeds.	K - * Gr. 1 - ** Gr. 5 - **	
10. Spring Blossoms ** Int'l Film Bureau, 1954; 20 min., color Time-lapse photography pictures spring flowers opening and growing. Among them are the azalea, camellia, hepatica, trillium, fern, May apple, foxglove, and buttercup.	Gr. 5 - * Gr. 7 - *	

* Good
** Excellent

Living Things - E. (continued)

Name and Description of Film	Other Grade Placements	Remarks
11. Summer is an Adventure ** Coronet, 1957; 11 min. Two young children learn that summer is a time for being outdoor--playing at the beach, catching fireflies, and picnicking--for seeing colorful flowers, plants, birds, and insects, for walking in the woods, and for enjoying long, warm, and bright days.	Gr. 4 - *	
12. Yours For a Song ** Roy Wilcox Prod., 1954; 22 min., black & white Shows a backyard bird sanctuary in Berlin, Conn., which was established to attract migrating and resident birds throughout the year. Explains that birds are attracted to yards and gardens if they are provided with food, water, and shelter. Includes views of twenty-four different species of birds.	K - ** Gr. 5 - **	

* Good
** Excellent

II. Living Things

F. Our bodies at work

Name and Description of Film	Other Grade Placements	Remarks
1. Exercise for Happy Living ** EBF, 1950; 11 min., black & white Dramatizes the role of exercise in building a strong body and a healthy, happy personality. Depicts a boy's keen disappointment at being only a substitute on the neighborhood ball team. Portrays his negative attitude toward exercise both in his school gym class and in performing simple tasks around the house. Reveals, by means of a dream sequence in animation, the healthy effects of exercise upon muscles and thus stimulates in the boy an eagerness to acquire good health habits of exercise.	Gr. 5 - **	
2. You - The Living Machine ** Walt Disney, 1959; 8 min., color Shows the difference between a living machine and a manufactured machine and how to take care of our living machines.	Gr. 5 - **	

* Good
** Excellent

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

Additions to
Page 22

II. Living Things

F. Our bodies at work

Name and Description of Film	Other Grade Placements	Remarks
Your Body and Its Parts ## EBF (Basic Life Science) 1964, 11 min., color This film is intended to provide an overview of the human physiology presented in the other six films of the series. It shows that when parts of the body work together to do a particular job, they form what is called a "system". Different systems are introduced: the muscle system, the respiratory system, the circulatory system, the skeleton and the nervous system. The film also shows how the systems of the body work together in performing many body functions.	Gr. 1 - ## Gr. 5 - ##	
Your Food ## EBF (Basic Life Science) 1964, 10 min., color This film shows what happens to the food you eat when it enters the digestive system. The relation of this to other body systems is shown. Because different parts of the body have different needs, it is important that you eat the right kind of food. Examples of what we call a "balanced diet" are shown.	Gr. 5 - *	
Your Protection Against Disease ## EBF (Basic Life Science) 1964, 8 min., color "Why is Kathy sick?" asks her brother, Rob, in this film, when illness upsets the family's plan for a picnic. Some of the ways in which "germs" spread disease are shown, along with examples of health habits that can prevent this. The film also shows how the body has certain ways of controlling the micro-organisms that do enter the body.		

* Good
## Excellent
4-28-67

II. Living Things

F. Our bodies at work

Name and Description of Film	Other Grade Placements	Remarks
Your Sleep and Rest ## EBF (Basic Life Science) 1964, 10 min., color Why do we need sleep and rest? This film, like others in the series, uses animation and simple analogies to show important body processes. In this case emphasis is made of the need for body cells to replenish their energy and building materials, and to eliminate wastes which accumulate. The part played by the circulatory system in this process is shown.		

# Good
## Excellent
4-28-67

SCIENCE MOTION PICTURE FILMS - Grade Three
(Addendum)

Additions to
Page 23

III. Energy

B. Sources and uses of heat

Name and Description of Film	Other Grade Placements	Remarks
Fire: What Makes It Burn ** EBF (Basic Physical Science) 1962; 11 min., color Simple laboratory experiments with matches, a candle, a piece of coal, dry wood, paint cans, and crushed brick demonstrate that fire needs fuel, heat and oxygen to burn, and that different degrees of heat are required for combustibility of different materials. Fire is extinguished when fuel/heat/oxygen are removed. We see a campfire and a forest fire and learn that fire can be dangerous as well as useful. Safety is stressed, and instructions are given for calling the Fire Department.	Gr. 5 - **	
Heat and How we Use it EBF (Basic Physical Science) 1963; 11 min., color Two boys experiment with heat, discovering its nature, its characteristics, how it travels, and its uses in everyday life. When they stir cocoa with a wooden spoon, the spoon handle does not get hot; when they use a metal spoon it burns their hands, but the thick cloth of a potholder slows the heat, acting as an insulator. An experiment shows the heat travels quickly through metals and slowly through wood and glass, and that though most things expand when they are heated, some expand more quickly than others. Heat always moves away from the place where it started. Without the sun--the source of heat--there would be no life on earth.	Gr. 5 -	No eval. yet No eval. yet

* Good
** Excellent
5-9-67

III. Energy - B. (continued)

Name and Description of Film	Other Grade Placements	Remarks
Thermometers and How They Work		No eval. yet
	Gr. 5 -	No eval. yet

EBF (Basic Physical Science) 1963; 10 min., color

Different kinds of thermometers and their uses are shown. A thermometer is made with colored water, a bottle, and a glass tube. When it is placed in a pan of hot water the liquid rises in the tube, demonstrating expansion; contraction is illustrated by placing the thermometer in cold water and watching the liquid go down again. Thermometers and their purposes are demonstrated. Heat is measured by the thermometers on a food freezer, a car dashboard. Thermometers are used for cooking, and in sick rooms; they are used by doctors, weather forecasters, fishermen and by lifeguards at the beach.

* Good
** Excellent
5-9-67

III. Energy

B. Sources and uses of heat

Name and Description of Film	Other Grade Placements	Remarks
1. Understanding Fire ** Coronet, 1956; 10 min. A young boy, helping his father to build a fire in an outdoor fireplace, becomes interested in the characteristics of fire and its uses. He learns that the basic requirements of fire are fuel, heat, and oxygen, and realizes that the usefulness of fire depends upon its control.	Gr. 4 - ** Gr. 5 - * Gr. 7 - **	Easy film For slow group

* Good
** Excellent

III. Energy

D. Effects of current electricity

Name and Description of Film	Other Grade Placements	Remarks
1. Making Electricity ** EBF, 1949; 11 min., black & white Demonstrates how electricity is made by moving a coil of wire through the field of a magnet. Explains how a small, hand-powered generator is constructed and how it operates; illustrates how the same principle applies in generating electricity at a large hydroelectric plant; and reveals how electricity is carried over power lines to the consumer.	Gr. 5 - ** Gr. 9 - **	For mature group

* Good
** Excellent

III. Energy

C. Mechanical energy and simple machines

Name and Description of Film	Other Grade Placements	Remarks
Making Things Move ** EBF (Basic Physical Science) 1962; 11 min., color The many kinds of forces which make things move are demonstrated by the movements of a windmill, sewing machine, bull-dozer, and rolling drum. A farm boy wonders what makes the baler, the barn elevator, the hole digger, the cart, and the truck move. He is lifted up into the truck, thrown back against the seat when it starts, and thrust forward when it stops. We see the effects of inertia, gravity, and friction--forces which keep things from moving and make them more difficult to move.	Gr. 6 -	No eval. yet

* Good
** Excellent
5-9-67

III. Energy

E. Earth's gravity

Name and Description of Film	Other Grade Placements	Remarks
1. Gravity - How It Affects Us ** EBF, 1960; 14 min., black & white Illustrates gravity's importance by showing some of the things that gravity does; its action upon our daily activities, its effects on our earth, and how it would affect a human being on an imaginary trip through outer space. Includes sequences on the experiments of Galileo and Isaac Newton.	Gr. 2 - ** Gr. 6 - ** Gr. 9 - **	Difficult

* Good
** Excellent

IV. The Universe

The sun and other stars

Name and Description of Film	Other Grade Placements	Remarks
1. The Sky **	Gr. 2 -	No eval. yet

10 min., color $110, International Film Bureau Inc.

This film deals with objects in the sky most of which are familiar to children. It begins with the sun, our dependence upon it, the shadows it causes, and the fact that it seems to pass across the sky. Clouds, their formation, and their interference with our vision of the sun, are also discussed. Considerable attention is given to the color of the sky with possible explanations for this color. Winds and the effects of winds are vividly shown. The moon and the stars are also mentioned.

* Good
** Excellent

SCIENCE MOTION PICTURE FILMS - Grade Three

(Deletions)

No. and Name of Film	Page No.	Reason
I. The Earth		
C. Water is everywhere		
Water and What It Does	Additions to Page 5 Addendum	Evaluated Gr. 3 No Good; Leave at Gr. 6 - ** and Gr. 7 - **
II. Living Things		
B. Animals live in communities		
12. The Robin	12	Removed from circulation by AV Dept.

5-9-67

For discussion purposes only

SCIENCE FILMSTRIPS

(35 mm.)

for
Grade Three

Correlated to the Unit Titles as found in the
Reorganized Science Curriculum

Minneapolis Public Schools
Science Department

TABLE OF CONTENTS

Unit Title	Page Number	Color
Introduction to Science		
A. Methods of Science......	1	Gray
B. Tools for measurement of time and direction	2	Gray
I. The Earth		
C. Water is everywhere	3	Pink
D. Air is everywhere.......	4	Pink
E. What makes the weather..	5	Pink
III. Energy		
B. Sources and uses of heat	7	Yellow
D. Effects of current electricity.............	9	Yellow

The annotations for filmstrips found on the following pages were obtained from sources such as the Wilson's Filmstrip Guide, producers' catalogs, and the Library of Congress cards.

Introduction to Science

B. Tools for measurement of time and direction

Name and Description of Filmstrip	Other Grade Placements	Remarks
1. Magnets Help to Find Direction ** Jam Handy Organization, 1960, 26 fr., color (Magnets Series, 6 f.s.), $5.75 each The class sees how a compass helps to find direction. They find that the compass needle is a magnet and learn to make a variety of compasses from other magnets.	Gr. 2 - ** Gr. 4 - **	

* Good
** Excellent

Introduction to Science

A. Methods of science

Name and Description of Filmstrip	Other Grade Placements	Remarks
1. What Is an Experiment? ** Jam Handy Organization, 1955; 24 fr., color (First Experiments About Weather Series, 6 f.s.), $4.75 each Art work illustrations. Billy discovers that an experiment is a test. He experiments to find the answers to his questions: Why does it get dark? Why does it rain? Why do airplanes fly?	Gr. 1 - ** Gr. 5 - **	For slow groups or review

* Good
** Excellent

SCIENCE FILMSTRIPS

Addendum

Grade Three Additions to Page 2

Introduction to Science

B. Tools for measurement of time and direction

Our Earth In Motion **

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

Facts concerning the earth in motion: its rotation, revolution, tilt, effects of gravity, time.

* Good
** Excellent
4-1-67

SCIENCE FILMSTRIPS

Addendum

Grade Three

I. The Earth

A. Features of the earth's crust

Climate *

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

How climate influences man's life. Reports from California, Alaska, Florida, American Samoa.

* Good
** Excellent
4-1-67

I. The Earth

C. Water is everywhere

Name and Description of Filmstrip	Other Grade Placements	Remarks
1. How Does Water Get Into The Air? **	K. - **	Excellent
Jam Handy Organization, 1955; 27 fr., color (First Experiments About Weather Series, 6 f.s.), $4.75 each	Gr. 2 - ** Gr. 5 - *	For slow groups or review
Art work illustrations. Johnny wonders where water comes from and how it gets up in the sky. Simple experiments show how water changes into vapor and evaporates.		

* Good
** Excellent

I. The Earth

D. Air is everywhere

Name and Description of Filmstrip	Other Grade Placements	Remarks
1. Living Things Need Air ** Jam Handy Organization, 1960; 25 fr., color (First Experiments With Air Series, 5 f.s.) $5.75 each Uses simple experiments to introduce primary-grade children to the scientific method of problem solving. Presents experiments to explain that living things need air. Captioned drawings.	K. - * Gr. 1 - **	

* Good
** Excellent

I. The Earth

E. What makes the weather

Name and Description of Filmstrip		Other Grade Placements	Remarks
1. What Is Wind? ** Jam Handy Organization, 1955; 31 fr., color (First Experiments About Weather Series, 6 f.s.), $4.75 each Art work illustrations. Through simple experiments with a pinwheel, a balloon and a plastic bag, Tommy discovers that wind is moving air and that air is real.		K. - * Gr. 1 - ** Gr. 3 - ** Gr. 5 - **	For slow groups or review
2. What Makes Things Dry Faster? ** Jam Handy Organization, 1955; 26 fr., color (First Experiments About Weather Series, 6 f.s.), $4.75 each Art work illustrations. Jane wishes she could make her painting dry faster. Through experiments, she learns that warm air and moving air make things dry faster.		Gr. 2 - ** Gr. 5 - **	For slow groups or review
3. Where Do Clouds Come From? ** Jam Handy Organization, 1955; 23 fr., color (First Experiments About Weather Series, 6 f.s.), $4.75 each Art work illustrations. Betty wonders where clouds come from and where they go. She performs a series of experiments which show her what causes clouds to form in the sky.		Gr. 2 - **	
4. Why Is the Night Cooler Than the Day? ** Jam Handy Organization, 1955; 20 fr., color (First Experiments About Weather Series, 6f.s.) $4.75 each Art work illustrations. Joe wonders why it is warmer in the day than it is in the evening. He uses a thermometer in experiments with the sunshine to learn the answer to his question.		K. - * Gr. 1 - ** Gr. 5 - *	For slow groups or review

* Good
** Excellent

SCIENCE FILMSTRIPS

Addendum

Grade Three

Addition to Page 6

I. The Earth

E. What makes the weather

The Sun And Our Seasons **

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

How hemispheres tipping toward or away from the sun causes seasons, length of days and nights. How temperatures of seasons are caused by length of days, directness of sun's rays, amount of air through which rays pass.

What Is Weather? *

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

Effects of weather on man's life. Temperature, precipitation, wind, sky conditions, humidity as components of weather.

What Makes The Weather? *

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

Concepts concerning what causes wind, how precipitation occurs, how different air conditions cause different weather.

* Good
** Excellent
4-1-67

III. Energy

B. Sources and uses of heat

Name and Description of Filmstrip	Other Grade Placements	Remarks

1. Heat Changes Things *

   Jam Handy Organization, 1962; 34 fr., color
   First Experiences With Heat Series, 6 f.s.)
   $5.75 each

   How and why heat can change a solid to a liquid; how and why it can change a liquid to a gas; how and why cooling can cause matter to change form.

2. Heat Makes Things Expand **

   Jam Handy Organization, 1962; 34 fr., color
   (First Experiences With Heat Series, 6 f.s.)
   $5.75 each

   Why gases, liquids and solids expand when heated; why most matter contracts when cooled; experiments and examples to further these understandings.

3. Heat Travels **

   Jam Handy Organization, 1962; 32 fr., color
   (First Experiences With Heat Series, 6 f.s.)
   $5.75 each

   Experiments showing that heat moves through matter; how heat moves at different speeds through different materials; conductors and insulators.

4. Thermometers *

   Jam Handy Organization, 1962; 31 fr., color
   (First Experiences With Heat Series, 6 f.s.)
   $5.75 each.

   What a thermometer is; how and why it can measure heat; how to read a thermometer.

* Good
** Excellent

III. Energy - B. (continued)

Name and Description of Filmstrip	Other Grade Placements	Remarks

5. What Is Heat? **

   Jam Handy Organization, 1962; 35 fr., color
   (First Experiences With Heat Series, 6 f.s.)
   $5.75 each

   An introduction to molecules; heat defined as the movement of molecules; how and why objects become warm or cool.

6. Where Do We Get Heat? *

   Jam Handy Organization, 1962; 33 fr., color
   (First Experiences With Heat Series, 6 f.s.)
   $5.75 each

   Fuels, friction and electricity as sources of heat; why the sun is our major source of heat; why heat is so vital for life.

* Good
** Excellent

III. Energy

D. Effects of current electricity

Name and Description of Filmstrip	Other Grade Placements	Remarks

1. Electricity and the Bowling Ball **

   WaSP Filmstrips, 1962, Palmer Lane West
   Pleasantville, N.Y., (Electrical Energy - Current
   1 f.s. in series), $

   A series of analogies establishing a relationship between bowling and electricity. The rolling of the ball; the work of hitting the pins; and the return of the ball represent a complete circuit. The muscular energy necessary for bowling is related to the battery. An artists representation of an atom is used to show the movement of electrons from one atom to the next. The flow of electrons along a wire is represented by clay balls on a wire.

* Good
** Excellent

JP:gm
1-14-64

SCIENCE FILMSTRIPS

Addendum

Grade Three

III. Energy

E. Earth's gravity

Our Earth In Motion **

Jam Handy; 39 fr., color

(Seasons, Weather & Climate) 1952
5 filmstrips, $5.95 ea., $29.00 set

Facts concerning the earth in motion: its rotation, revolution, tilt, effects of gravity, time.

* Good
** Excellent
4-1-67

EQUIP. & SUPPLIES

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS February 1966

Item No.		Unit	Unit Price
32-0140	ALCOHOL, Denatured	quart	.34
17-0100	ALUMINUM FOIL, 15" x 50', to waterproof table tops	roll	.62
17-0110	ALUMINUM FOIL, 18" x 50', for use under an aquarium or terrarium	roll	1.03
28-0100	ANIMAL PEN, 18" x 24" x 18" high	each	6.61
28-0105	ANIMAL PEN, cage, 9" x 9" circular	each	4.55
28-0110	ANT HOME, Turtox 220A167	each	7.50
	AQUARIUMS, TERRARIUMS AND SUPPLIES:		
28-0030	ACID NEUTRALIZER	ounce	.45
28-0040	AERATOR, Saxon	each	6.00
28-0200	AQUARIUM, 3 gallon, seamless	each	6.34
28-0300	AQUARIUM, 6 gallon	each	9.07
28-0340	AQUARIUM CEMENT	lb.	.60
	AQUARIUM COVER (include pattern w/requisition)		
28-0390	9-7/8" x 5-3/4", clear plexiglass	each	.42
28-0400	9-7/8" x 5-3/4", glass, double strength	each	1.00
28-0490	9-1/2" x 17-1/2", clear plexiglass	each	1.27
28-0500	9-1/2" x 17-1/2", glass, double strength	each	1.23
28-0600	AQUARIUM AND TERRARIUM SEALER	tube	.30
28-2100	CHARCOAL, Chunk	5# bag	.43
28-3000	DIP NET, 3" wide, 3-1/2" deep	each	.35
28-3020	DIP TUBE, plastic, 16", no scraper attachment	each	.90
28-3025	AQUARIUM METAL SCRAPER, long handle	each	.60
28-3290	FEEDING RING, 2"	each	.20
47-3260	GLASS SCRAPER, all metal	each	.18
47-0340	BLADES for above scraper	each	.02
28-4160	GRANITE CHIPS	lb.	.034
28-4180	GRAVEL	lb.	.05
28-7460	SAND	lb.	.15
28-8100	SOIL, sterile	bushel	1.50
28-9320	TEMPERATURE CONTROL OUTFIT: Thermostat #340 to include one of the following:	each	5.85
28-4310	PENCIL HEATER, 25 w, for aquarium, 1 to 3 gallon	each	2.00
28-4320	PENCIL HEATER, 50 w, for aquarium, 4 to 6 gallon	each	2.00
28-4330	PENCIL HEATER, 75 w, for aquarium, 7 to 15 gallon	each	2.75
28-0700	ASPIRATOR, Chapman pump, Cenco 13205-3, w/adapters to connect to sink	each	3.25
28-0705	HOSE FOR ASPIRATOR, black (indicate footage needed)	ft.	.27
28-0800	BALANCE, demonstration, clamp and support only (must order meter stick #28-5380 to complete set)	each	2.60

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS

Item No.		Unit	Unit Price
28-0820	BALANCE, TRIPLE BEAM, stainless steel, capacity 610 gms Note: by use of auxiliary weights this balance can be used to a maximum of 2610 gms	each	15.35
28-0825	AUXILIARY WEIGHT SET, for use with Triple Beam Balance. Increases capacity from 610 gms to 2610 gms. Set consists of 2 1,000 gm weights and 1 500 gm weight.	set	4.50
28-0830	WEIGHT, 500 gm, for use with Triple Beam Balance (to replace any lost in Auxiliary Weight Set)	each	1.50
28-0835	WEIGHT, 1,000 gm, for use with Triple Beam Balance (to replace any lost in Auxiliary Weight Set)	each	1.50
28-0840	BALL AND RING	each	4.11
15-1200	BALLOONS, rubber	doz.	.46
28-0900	BAROMETER, ANEROID, 6" diameter, round wooden case	each	3.33
28-2150	BATTERY CELL HOLDER for "D" dry cell, mounted on board with Fahnestock clips for easy connection	each	.50
	BEAKER, Griffin, low form, Pyrex		
28-0940	100 ml	each	.40
28-0960	150 ml	each	.39
28-0980	250 ml	each	.39
28-1000	400 ml	each	.46
28-1020	BEAKER, Griffin, low form, stainless steel, 600 ml	each	2.97
28-1030	BELL, DOOR, electric, D.C., 2-1/2" diameter	each	1.64
28-1060	BELL OUTFIT, electric, dry cell, push button, 1 lb annunciator wire and staples	each	4.12
28-1500	BOTTLES, 4 oz. wide mouth (gas collecting bottle)	doz.	.66
28-1520	BOTTLES, 8 oz. wide mouth (gas collecting bottle)	doz.	.89
28-1540	BOTTLES, 4 oz. (baby food jar type with bakelite screw cap)	doz.	1.61
28-1570	BROM THYMOL BLUE, Crystaline, Free acid form, Harleco #862 (to detect the presence of carbon dioxide -- for the study of the constituents of air and the respiratory activities of plants and animals)	1-gram bottle	1.50
28-1600	BRUSH, Test tube, 3/4" x 3-1/2"	each	.13
28-1620	BURNER, Alcohol lamp, glass, 4 oz.	each	.74
28-1640	BURNER, Turner, liquid petroleum, tank + LP, Bunsen-type	each	7.95
70-4550	REPLACEMENT TANK	each	.98
28-1700	BUZZER, electric	each	1.73

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS

Item No.		Unit	Unit Price
28-2010	CALCIUM HYDROXIDE SOLUTION, limewater (Also see Lime Water Tablets #28-4810)	1# bottle	.60
28-2030	CANDLES, Paraffin	doz.	.48
28-2040	CASTER CUPS, glass	each	.10
28-2050	CAT'S SKIN, half	each	3.64
28-2060	CELL, student's demonstration	each	3.15
28-2110	CHIMNEY, lamp	each	1.00
28-2120	CLAMP, Burette	each	1.20
28-2140	CLAMP, pendulum	each	2.30
28-2160	CLIP, Fahnestock, to be used to mount electrical apparatus (10 in package)	pkg.	.17
28-2200	COMPASS, magnetic, 16 mm diameter	each	.25
28-2240	COMPASS, magnetic, about 45 mm diameter	each	.70
28-2300	COMPOUND BAR, bi-metal	each	.78
28-2400	CONDUCTOMETER, four 5" wires on handle, overall length 13 inches	each	2.05
28-2500	CORKS, assorted, xx quality, sizes 0-11 (100 in bag)	bag	1.35
28-2540	CORK BORER, set of 6, 1/2" largest borer	set	6.20
28-2560	COTTON, absorbent, not sterilized	lb.	.90
28-2600	CULTURE DISHES, Petri, Pyrex, 100 mm x 15 mm	pair	.60
17-3380	CUPS, measuring, Set of 4 (1 C, 1/2 C, 1/3 C, 1/4 C)	set	.36
28-2700	CYLINDER, graduated, Tuttle, short form, 100 ml capacity	each	2.70
28-2720	CYLINDER, hydrometer jar, 275 ml capacity, 13-38" high	each	2.40
28-3015	DISHES, evaporating, Coors 430, 75 mm diameter, 30 mm high, 70 ml capacity	each	.47
28-3040	DISSECTING NEEDLE, wooden handle, bent needle	each	.10
28-3050	DISSECTING NEEDLE, wooden handle, straight needle	each	.07
28-3100	DROPPER, medicine, (12 to pkg)	pkg.	.46
28-3140	DROPPING BOTTLE, 30 ml	each	.35
59-0130	DRY CELL, 1½ volt, #6, diameter 2-1/2", height 6"	each	.64

Item No.		Unit	Unit Price
28-3200	ELECTRIC PLATE, 3 heat, 1000 watt, 110 volt	each	6.14
28-3240	ELECTROMAGNET, horseshoe type	each	11.40
28-3260	ELECTROSCOPE, flask form, 250 ml, Pyrex Erlenmeyer flask	each	2.85
28-3280	ETHYL ACETATE, for killing insects	lb.	1.26
28-3300	FEHLING'S SOLUTION, A	16 oz bottle	1.20
28-3320	FEHLING'S SOLUTION, B	16 oz bottle	1.55
28-3400	FILE, Triangular, 4"	each	.38
28-3500	FILTER PAPER, qualitative, 100 circles per package, 11 cm diameter	pkg.	.44
28-3600	FLASK, Erlenmeyer, narrow mouth, Pyrex, 250 ml	each	.48
28-3620	FLASK, Erlenmeyer, narrow mouth, Pyrex, 500 ml	each	.61
28-3800	FUNNEL, plastic, 73 mm, or 2-7/8" top diameter	each	1.14
28-4000	FUNNEL, Pyrex, 65 mm or 2-1/2" top diameter	each	.75
28-4100	FUNNEL, thistle top, 30 cm or 12" length, 35 mm or 1-1/4" diameter	each	.36
	GLOVES, rubber:		
28-4120	size 8	pair	.80
28-4130	size 9	pair	.80
28-4140	size 10	pair	.80
28-4200	GYROSCOPE, simple form, 5.5 cm diameter, support and starting cord	each	1.25
28-4360	HYDROCHLORIC ACID (HCL)	lb.	1.03
28-4400	HYGROMETER, Humidiguide, direct reading	each	9.00
28-4500	IRON FILINGS	1# carton	.38
28-4600	JAR, battery, cylindrical, 1 gallon	each	1.42
28-4800	LAMP, incandescent, miniature, 2-1/2 volt maximum, screw base	each	.25
28-4805	LENSES, demonstration set, 3.75 cm diameter, 6 in set	each	5.25
28-4810	LIME WATER TABLETS (See Calcium Hydroxide Solution, #28-2010)	each	.0075
28-4820	LITMUS PAPER, blue, 100 strips in vial	vial	.09
28-4840	LITMUS PAPER, neutral, 100 strips in vial	vial	.09
28-4860	LITMUS PAPER, red, 100 strips in vial	vial	.09

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS

Item No.		Unit	Unit Price
28-4940	MAGNETS, bar, steel, 2 in box with keepers	set	1.80
28-5100	MAGNETS, ceramic cylinders, 3/8" x 1/8", #1054	each	.03
28-5000	MAGNETS, ceramic cylinders, .52" x .25", #866	each	.03
28-5140	MAGNETS, "floating"	each	3.25
28-5200	MAGNETS, horseshoe, 2.8 cm	each	.60
28-5240	MAGNETS, horseshoe, 4 cm	each	2.20
28-5250	MAGNETS, natural, lodestone	each	.22
28-5260	MAGNETIC NEEDLE, on stand	each	2.45
28-7100	MAGNIFIER, round, 3" diameter reading glass with handle, 2x to 3x	each	1.25
28-5300	MAGNIFIER, small, premium plastic, 3-5/8" long, fitted with two spherical convex lens (3x and 7x) and two cylindrical magnifiers	each	.31
28-5280	MAGNIFIER, tripod, 10x	each	1.10
28-5320	MAT, asbestos, 10" x 16"	each	.65
28-5340	MAT, wire gauze, asbestos center, 4 inch	each	.21
28-5380	METER STICK, maple, metric and English scales	each	.85
28-5400	MICROSCOPE, ELECTRIC, including: 50X and 100X objectives, 12 prepared slides, micromount cards, one 32 page booklet, "The Microscope in Elementary Science", and wood case	each	18.18
18-4600	ELECTRIC LIGHT BULB, 6 watt, 115 volt, candelabra bayonet base (replacement bulb for item #28-5400)	each	.18
28-5410	MICROSCOPE, model ESM, 100X Bausch and Lomb (No Sub) Cat. 31-33-03 (Price includes illuminator, item #28-5425)	each	15.00
28-5420	MICROSCOPE, ZOOMSCOPE, Model STZ 100 Bausch and Lomb (No Sub) Cat. 31-21-03 Magnification 25x through 100 x Zoom. (Price includes illuminator, item #28-5425)	each	53.00
28-5425	ILLUMINATOR, portable, Bausch and Lomb (No Sub) Cat. 31-33-03 Rite-Lite	each	3.00
28-5426	LAMP, replacement for microscope illuminator (Rite-Lite) Item #28-5425, 9-3/4 watt, candelabra, screw base, Bausch and Lomb, (No Sub) Cat. 31-31-40	each	.15
28-5500	MICROSCOPE SLIDES, culture	each	.12
28-5600	MICROSCOPE SLIDES, plain, 72 per box	box	1.10
28-5700	MIRROR, concave and convex, 75 cm diameter, 20 cm focus	each	1.00
28-5740	MIRROR, plane, square, 10 cm x 10 cm	each	.20
28-5800	MORTAR AND PESTLE, porcelain, Coors 522, 100 mm diameter, 60 mm high, 115 mm pestle length	set	1.66
28-5840	MOTOR, St. Louis, with 2 bar magnets; electromagnet attachment, $6.15	each	13.50

Item No.		Unit	Unit Price
28-5860	NEEDLES, DARNING, 10 in pkg.	pkg.	.25
28-5880	NEEDLES, KNITTING, 12 in pkg.	pkg.	.55
28-5900	PAN, Dissecting, 12" x 7-1/2" x 5/8" deep	each	1.20
28-5910	PAN, METAL, vitreous enamel, 16-3/8" x 10" x 2-1/8"	each	2.50
28-5920	PAN, METAL, vitreous enamel, 20-1/2" x 12-3/4" x 2-3/8"	each	3.64
28-5930	PAPER, BLUEPRINT, 5 x 7, 24 sheets	pkg.	.49
28-5940	PAPER, BLUEPRINT, 8 x 10, 24 sheets	pkg.	1.29
28-5960	PINS, SILK, #2, for mounting insects (100 per pkg.)	pkg.	.43
28-5980	PITH BALLS, 12	pkg.	.80
28-6100	PLANT FOOD, "Plantabbs", 100 in pkg.	pkg.	.20
28-6000	PLANETARIUM, Universal, shows day and night, seasons, length of day, phases of moon, earth-sun-moon phases, includes manual	each	24.00
28-6200	PLATES, glass, flat, 12 to pkg. 2" x 2" x 1/16" thick	pkg.	.30
28-6220	POTS, FLOWER, unglazed earthenware, 4" diameter	each	.10
28-6240	PRISM, equilateral, flint glass, 75 mm long	each	2.00
28-6300	PULLEY, double, Bakelite	each	1.15
28-6340	PULLEY, single, Bakelite	each	.80
28-6400	PULLEY, double tandem, Bakelite	each	1.55
28-6440	PULLEY, triple tandem, Bakelite	each	2.05
28-6500	PUMP, model, plastic, force	each	5.65
28-6540	PUMP, model plastic, lift	each	4.95
28-7000	RADIOMETER	each	.80
28-7140	RECEPTACLE, screw base, for incandescent lamp, miniature, item #28-4800 (unmounted)	each	.25
28-7145	RECEPTACLE, screw base, for incandescent lamp, miniature, (mounted on board with Fahnestock clips for easy connection) -- 2 lamps included	each	.94
28-7020	RAIN GAUGE, wedge shape	each	3.95
28-7300	ROD, FRICTION, glass, 300 mm x 13 mm	each	1.10
28-7340	ROD, FRICTION, hard rubber, 250 mm x 13 mm	each	.70
28-7360	ROD, soft iron (used as electromagnet core)	each	.25
28-7400	RUBBER STOPPERS, assorted sizes, 00-8 (solid, one-hole and two-hole)	2 lb.	2.40

Item No.		Unit	Unit Price
17-5800	SALT SHAKER, glass, for iron filings	each	.08
28-7480	SCALE, balance, spring dial type, 250 gms or 9 oz. capacity, Cenco 5410 - or equal, (to determine the weight of objects weighing less than one-half pound and small forces)	each	2.25
28-7490	SCALE, balance, spring, dial type, 500 gms or 18 oz. capacity, Cenco 5510 - or equal, (to determine the weight of objects weighing one pound or less and to measure small forces)	each	2.25
28-7500	SCALE, balance, spring, dial type, 2,000 gms or 72 oz. capacity	each	2.25
28-8000	SCIENCE KIT AND MANUAL, contains almost all necessary initial equipment for elementary science	each	42.00
28-8040	SILK PAD, exciting	each	.55
28-8200	SPOON, DEFLAGRATING, iron, 3/4" diameter cup, total length 15"	each	.26
28-8300	SUPPORT, iron, rectangular base, 4-7/8" x 8", w/rod	each	1.90
	SUPPORT, ring with clamp		
28-8400	2-1/2" inside diameter	each	.95
28-8500	3-3/8" inside diameter	each	1.05
28-8520	SWITCH, KNIFE (unmounted) single pole, single throw	each	.40
28-8525	SWITCH, KNIFE (mounted on board with Fahnestock clips for easy connection) single pole, single throw	each	1.13
59-0570	SWITCH, PUSH BUTTON (unmounted)	each	.50
28-8530	SWITCH, PUSH BUTTON (mounted on board with Fahnestock clips for easy connection)	each	1.08
28-8600	TELEPHONE RECEIVER	each	5.00
28-8640	TELEPHONE TRANSMITTER	each	4.00
28-8700	TEST TUBES, Pyrex, 6" x 5/8"	each	.0508
28-8740	TEST TUBE CLAMP (Holder)	each	.11
28-8800	TEST TUBE RACK, wood, 6 holes and 6 pins	each	.70
28-9000	THERMOMETER, Celsius, (Centigrade) laboratory type, (-10°C to 110°C)	each	1.80
28-9005	THERMOMETER, Celsius, (Centigrade) student type, (-30°C to 50°C) inexpensive thermometer mounted on plastic backing	each	.15
28-9040	THERMOMETER, Fahrenheit, laboratory type, (0°F to 230°F)	each	1.40
28-9050	THERMOMETER, Fahrenheit, student type	each	.15
28-9100	THERMOMETER, metal, protected bulb, white enamel, scale in black	each	1,08
28-9200	THERMOMETER, outdoor, metal, protected bulb, mounting brackets, swivel type	each	1.53
28-9300	THERMOMETER, wooden back, natural finish	each	1.20

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS

Item No.		Unit	Unit Price
16-3420	THREAD, black No. 50	spool	.09
16-3520	THREAD, white No. 50	spool	.09
28-9340	TONGS, beaker, Fisher improved	pair	6.50
28-9360	TONGS, crucible, Parkerized steel	pair	.38
	TOOLS:		
32-4740	HAMMER, claw, 10 oz. head	each	2.24
28-4300	HAMMER, geologist, 22 oz. head	each	5.50
32-6300	PLIERS, combination, adjustable, 6"	each	.50
32-7460	SAW, HACK, adjustable	each	1.18
32-0930	BLADE, HACKSAW, 12", 14 teeth	each	.10
32-7550	SCREWDRIVER, 4" blade, Stanley #20	each	.71
32-8750	SHEARS, tinners snips, 3" cutting length, Wiss #9	pair	2.29
28-9400	TUBING, GLASS, lead-potash, 6 mm outside diameter	lb.	.55
28-9420	TUBING, RUBBER, 3/16", black	ft.	.27
28-9440	TUBING, RUBBER, 3/16", red	ft.	.27
	TUNING FORK, unmounted		
28-9500	128 vps	each	5.50
28-9520	256 vps	each	5.50
28-9540	320 vps	each	5.15
28-9560	384 vps	each	5.15
28-9580	512 vps	each	5.00
15-9200	TWEEZER, length - 4-5/8"	each	.31
12-8600	VERMICULITE	5# bag	.20
28-9600	VOLT-AMMETER, pocket type, DC, range 0-10 volts, 0-35 amperes	each	3.60
28-9640	WATCH GLASS, Pyrex, 75 mm diameter	each	.15
28-9700	WEATHER VANE, with base, metal, directions plainly marked	each	.83
28-9720	WEIGHTS, BALANCE, AVOIRDUPOIS, iron, class T, 1/2 oz. to 1 lb. (set of 8)	set	5.00
28-9740	WEIGHTS, METRIC, HOOKED, 10 gm - 1 kgm	set	14.25
28-9750	WEIGHTS, BALANCE, METRIC, in wood block, 1 gm - 500 gm	set	8.25
28-9770	WIRE, copper, annunciator, #22, vinylite covered	1# coil	2.34
28-9780	WIRE, iron, 17 gauge	4 oz spool	.34
28-9800	WOOD SPLINTS, 500	pkg.	.63

BASIC SCIENCE SUPPLIES FOR ELEMENTARY SCHOOLS

Item No.		Unit	Unit Price
	BIRD CARDS, Audubon, postal card size, 50:		
28-1100	Summer	box	1.20
28-1200	Winter	box	1.60
28-1300	Spring	box	1.60
28-1400	BIRD CHARTS, Audubon, 20" x 30", set of 4: Winter, Summer, Game Birds, and Birds of Prey	set	3.55
28-7200	R[illegible]CLE CHART	each	10.95
	ROCK COLLECTION:		
28-7210	KINDERGARTEN, 5 specimens to illustrate the Kindergarten concepts, each 3" x 3" x 2" (unmounted)	set	1.40
28-7220	GRADE ONE, 9 specimens to illustrate the First Grade concepts, each 3" x 3" x 2" (unmounted)	set	1.40
28-7230	GRADE FOUR, 9 specimens to illustrate the Fourth Grade concepts, each 3" x 3" x 2" (unmounted)	set	1.40

(Schools may purchase emergency supplies directly, paying for same out of the school building's funds. Principals are requested to accumulate receipts of at least five dollars ($5.00) and then make a general requisition (form G1000) to cover the items purchased. Attach all receipts and send the requisition to the Finance Department for reimbursement from the individual school's supply allotment.)

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1/27/66